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ASIATICK RESEARCHES,

OR,

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED IN BENGAL,

FOR ENQUIRING INTO THE

HISTORY AND ANTIQUITIES, THE ARTS, SCIENCES, AND LITERATURE,

OF

ASIA.

VOLUME THE THIRTEENTH.

CALCUTTA:
PRINTED AT THE CALCUTTA GAZETTE OFFICE,
1820.

162,925

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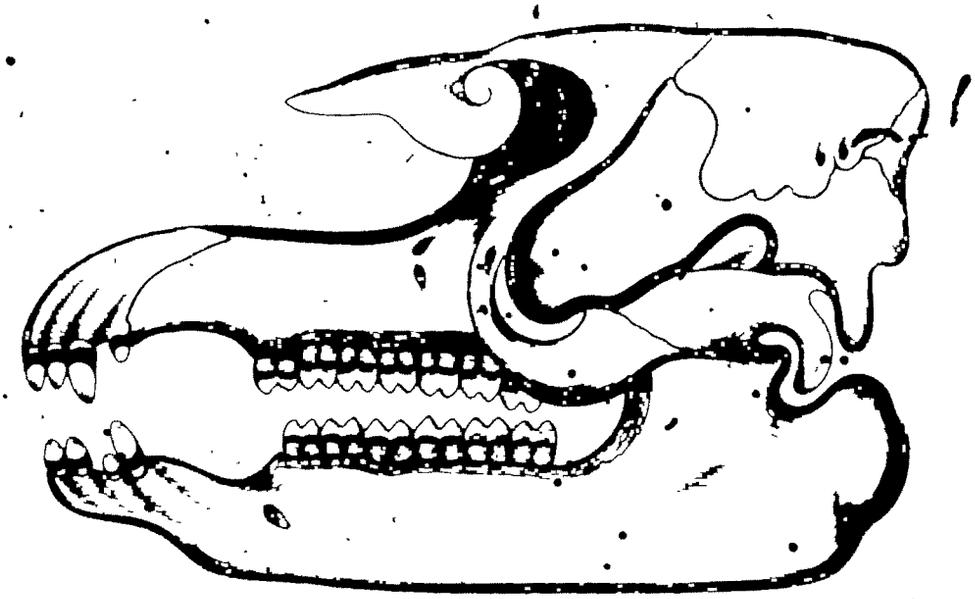
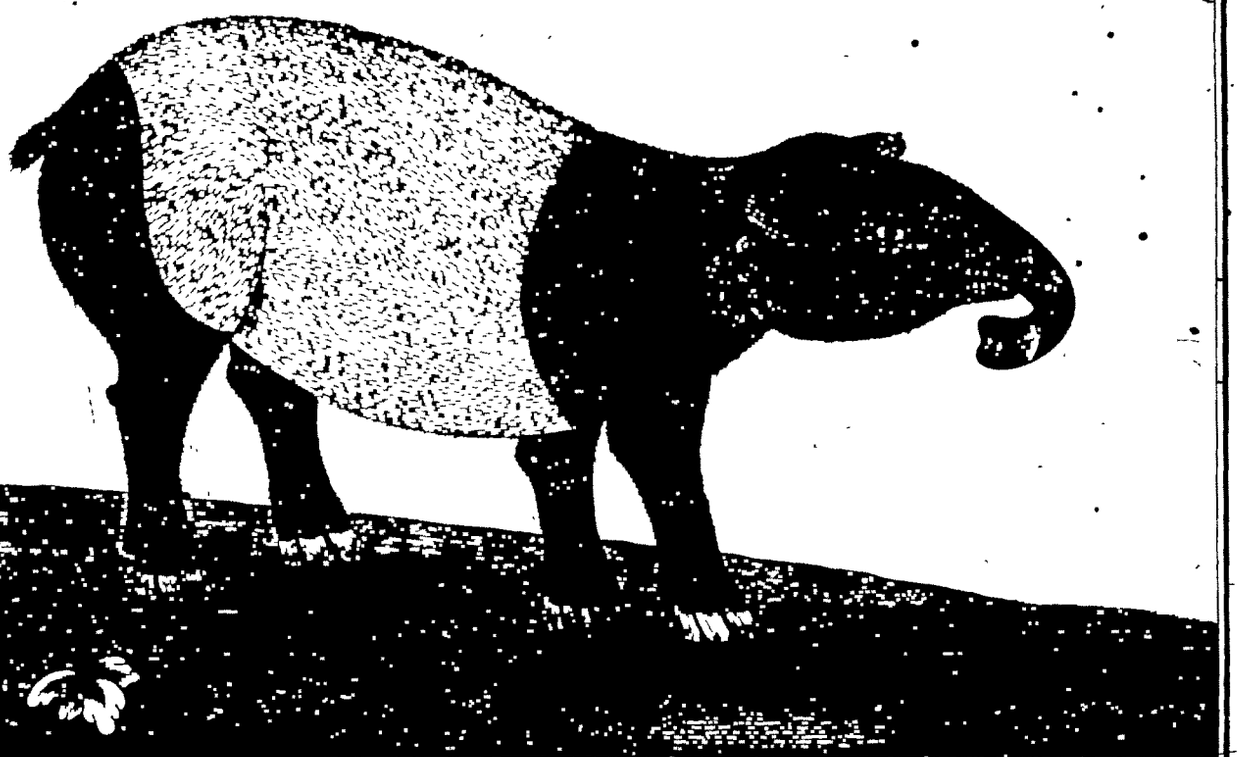




[illegible]

[illegible]

[illegible] SOCIETY.

THE following is an abstract of the Rules of this institution, which are now in force, including those printed in the Appendix to the first and subsequent volumes of the Society's Transactions:

[illegible] Rules, copied from the Founder's discourse, 25th February 1784.

1. That the institution be denominated the *Asiatick Society*; that the bounds of its investigations be the geographical limits of *Asia*, and of those parts of it, its enquiries be extended to whatever is performed by the people, or produced by nature.

2. [illegible] be held for the purpose of learning, [illegible] and publishing, such subjects as fall within the scope of the Society's enquiries.

[illegible] of the Society.

4. That the Society's [illegible] [illegible] [illegible] [illegible] [illegible] of valuable [illegible] be received.

5. That mere translations of considerable length be not admitted, except of such unpublished essays or treatises as may be [illegible] to the Society, by native authors.

6. That all questions be decided on a ballot, by a majority of [illegible] [illegible], and that [illegible] Members be required to constitute a Board for such decisions.

7. That no new Member be admitted who has not expressed a voluntary desire to become so; and in that case, that no other qualification be required than a love of knowledge, and a zeal for the promotion of it.

Subsequent resolutions of the Society which are in force.

8. That the annual meetings of the Society be held on the [illegible] Wednesday of each alternate month, viz. in the months of [illegible], [illegible], June, August, October, and December, [illegible] [illegible] [illegible] [illegible] meetings.

9. That if any business should occur to require [illegible] meeting [illegible], they may be convened by the President, [illegible] [illegible] necessary, appoint any [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] and meetings of the Society.

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] the Religion

[illegible]

[illegible] President and the Vice President [illegible] meeting [illegible] after the [illegible] time [illegible] shall take the chair for the evening.

[illegible] every Member of the Society have the privilege of [illegible] any gentleman who is not already a Member [illegible]

[illegible] In order to provide funds for the ordinary expenses of the Society an Admission fee be established [illegible] of [illegible] payable by every Member on his admission and that each Member of the Society, resident in India, honorary Members [illegible] shall be entitled to pay annual quarterly, in the first [illegible] of January, April, July, and October. Any Member neglecting to pay his subscription for half a year after it becomes due to be considered no longer a Member of the Society.

[illegible] Treasurer be appointed.

[illegible] In addition to the Secretary [illegible] be appointed.

[illegible]

[illegible]

[illegible] Committee of papers be [illegible] to [illegible] whether for any [illegible] expedite to defray [illegible] of the Collections, and that an order signed by [illegible] be [illegible] to the Treasurer for paying [illegible]

[illegible] That the Committee of Papers be [illegible] to determine [illegible] contingent expenses on account of the Society, which [illegible] deem indispensable.

[illegible] That the agent of the Society in England be [illegible] charge of Mr. [illegible] for the Society's Library, a [illegible] of [illegible] and literature published in Europe, [illegible] the [illegible] arising from the sale of the [illegible]

[illegible] That the Committee of Papers be requested [illegible] to Europe, [illegible] further instructions [illegible] their [illegible] the collection of [illegible] Library of the Society.

[illegible] That it will be [illegible] proper [illegible] the [illegible] Committee of [illegible]

[illegible]

RULES OF THE SOCIETY.

[illegible] to the Society [illegible] the [illegible] *Asiatick* [illegible] [illegible] Members of the Society, [illegible] the [illegible] of the Papers; wherein such [illegible] contained, [illegible] completely [illegible] the [illegible], to the [illegible] the Society.

[illegible] every subscribing Member of the Society [illegible] furnished with a copy of the [illegible] volume [illegible] of any [illegible] volumes of the Society's *Transactions*, [illegible] without any further payment.

[illegible] with a view to the more general circulation of the *Asiatick Researches* in *India*, the price of the [illegible] future volumes [illegible] fixed at [illegible] gold mohurs; [illegible] of foreign [illegible] of different years be purchased together, they be sold [illegible]

MUSEUM.

[illegible] On the 23d [illegible] May 1814, the Society determined [illegible] upon [illegible] for the reception of all articles that may tend to illustrate [illegible] and history; or to elucidate the particular [illegible] of nature [illegible] in the East. The following resolutions [illegible] the [illegible] published upon the subject:

[illegible] be made known to the public, and that [illegible] be [illegible], of the undermentioned [illegible]

[illegible] of the [illegible] of [illegible]

[illegible]

[illegible] way [illegible]

[illegible] of [illegible]

[illegible] ... pe[illegible] in [illegible] or [illegible]

[illegible] implements [illegible]

[illegible] animals [illegible] dried or preserved.

[illegible] skeletons or particular bones of animals [illegible]

[illegible] birds [illegible] stuffed or preserved.

[illegible] Fossil [illegible] shells, &c.

[illegible] Mineral or vegetable preparations in Eastern [illegible]

15. [illegible] metals.

16. Native alloys of metals.

[illegible] Minerals [illegible] description, &c. [illegible]

[illegible] names of persons contributing to the [illegible] of the Society, be hereafter published at the end of each volume of the *Asiatick* Researches.

[illegible] the hall on the ground floor of the Society's [illegible] for the reception of the articles that [illegible] expences of [illegible] to be regulated by [illegible] and Secretary [illegible] the [illegible] may be granted.

[illegible] the expences which may be [illegible] preparing [illegible], & [illegible] for preservation, be [illegible] the Society [illegible] a certain sum fixed [illegible]

[illegible] That [illegible] the Society be [illegible] for the [illegible] of the articles and the [illegible] of [illegible]

[illegible]

[illegible] Superintendent with Doctor [illegible]

[illegible] On the 30 June 1819, the Superintendent of the Museum was requested to return the thanks of the Society to the [illegible] who gave a donation to the Museum, and received the [illegible] acknowledgement for the [illegible] to which [illegible] had made to the Museum.

BIBLIOTHECAL RELATIONS

The following resolutions were passed, on the recommendation of the Committee of Papers, under the [illegible] Society's Institutes have not yet been received [illegible] publishing [illegible] of the work therein [illegible]

[illegible] the *Susquehanna* and other [illegible] of books of greater [illegible] which [illegible] and [illegible]

[illegible] may be [illegible] of America [illegible] be [illegible]

APPENDIX.

[illegible]

[illegible]

Physical and Literary Characteristics.

37. At the suggestion of one of the Members of the [illegible] resolved, on the *Ninth November 1805*; *That* [illegible] formed to propose such plans and carry on such correspondence [illegible] seem best fitted to promote the knowledge of natural history, mineralogy, the improvements of the arts, or whatever is comprehended in the general term of *physics*; to consult of such Memoirs as may properly under them for that purpose; and that a Committee be formed in the manner, for the science, mineralogy, antiquities, and whatever is comprehended under the general term of *literature*.

38. The following Rules for the [illegible] were adopted by the Society on its [illegible] 1818.

[illegible]

[illegible]

[illegible] Committee [illegible] Secretary [illegible] Committee, [illegible] that a Deputy [illegible] committee, to be elected at the [illegible] Committee [illegible] Committee [illegible] Committee [illegible] Deputy [illegible]

[illegible]

[illegible]

[illegible]

LIST OF DONATIONS, TO THE LIBRARY, &c.

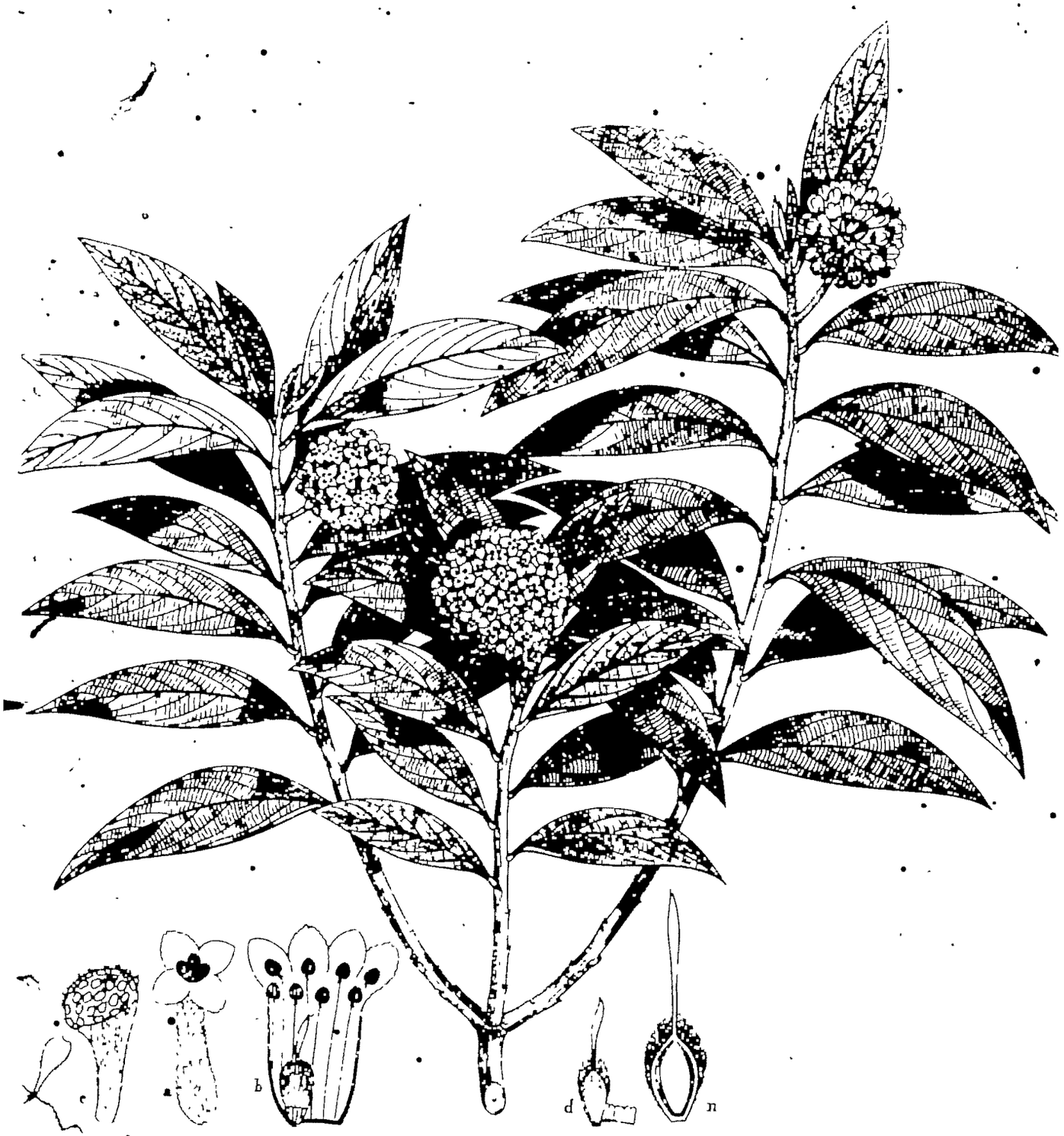
DONORS.	DONATIONS.
The ROYAL SOCIETY OF COPENHAGEN	Transaction of the Copenhagen Royal Society, 10 vols.
	A set of maps of *Denmark*.
Dr. WALLICH,	Works on the languages and wisdom of the Indians, by F. Schlegel.
Lt. R. HOME,	History of the *Rájas* of *Mrattan*.
	The Hitopadésha.
	Prophecies in the *Mug'h* language.
Dr. J. R. VOS,	Heel Kundige werken Van F. Rutsch, 3 vols.
	Menschelycken Lichaems.
	Eertijts in't Latijn, 1 vol.
H. T. COLEBROOKE, ESQ.	Translation of the Lilávati, from the original Sanscrit, by H. T. Colebrooke, Esq.
The COLLEGE OF FORT WILLIAM, ON THE PART OF GOVERNMENT,	A Dictionary of the Chinese language, 1st part, vol. 1st, by the Rev. Mr. Morrison.
	Dialogues in the Chinese language.
The HON. C. F. STUART,	Bartholomeo's Systema Brahmanica.
THE ROYAL SOCIETY OF CAEN,	Souscription pour une Medaille en l'honneur De Malherbe; and a few tracts on Statistical subjects.
MONS. CUVIER,	A Variety of his Works.
MONS. DIARD,	Memoire pour servir à l'Histoire; et l'Anatomie des Moturquere.
MONS. DU TROCHET	Researches sur les Enveloppes du Fœtus; et Researches sur les Rotifères.

LIST OF DONATIONS, TO THE LIBRARY, &c.

DONORS.	DONATIONS.
Mons. Humboldt.	Memoire sur l'Elevation des Montagnes de l'Inde's.
A. Seton, Esq.	The Rámáyana, and the Java Alangara, or Annals of Victoly; two Javanese Manuscripts.
Rev. J. Marshman,	Pentateuch in Chinese, printed with movable metal types at Serampore.
Baron De Sacy,	Calila et Dimna, in Arabic.
Major Farquhar,	Drawings of several animals at Malacca.
E. S. Montague, Esq.	Three Javanese Manuscripts.
	The Ulugh Beighi Tabulæ Stellarum.
Mons. Du Vausel,	Voyage Dans l'Amérique.
Mons. Humboldt.	Vues des Cordillères, et Monumens des Peuples Indigenes de l'Amérique.
The College Council of Fort William, on the part of Government,	A Comparative Chronology of the Chinese Empire.
H. T. Colebrooke, Esq.	Some Tracts which have been published by learned foreigners.
Mons. Van Hamman,	Three numbers of the Mines of the East; and a Series of Leipsic Literary Journals.
The College Council of Fort William, on the part of Government,	Morrison's Chinese and English Dictionary.
J. Siddons, Esq.	A copy of the Malay Code of Laws.

LIST OF DONATIONS, TO THE LIBRARY &c.

DONORS.	DONATIONS.
Baron De Sacy,	Mysteres du Paganisme, by Monsr. De Saint Croix, 2 volumes.
	Mr. Auvaroff, on the Mysteries of Eleusis.
	Some Pamphlets published at *Paris* on subjects of Oriental Literature.
Captain Roebuck.	Boorhani Qatio, a Persian Dictionary, Edited by Capt. T. Roebuck.
The Society for the Encouragement of Arts, &c.	Transactions of the Society for the Encouragement of Arts, &c. 29th to 35th vol.
Thos. Wilson,	Researches on *America*.
Mr. Vaughan Librarian of the *American Philadelphia* Society.	Transaction of the American Philosophical Society, new series, 1st volume.
Mr. Vaughan	Journal of the Academy of Natural Sciences of America, vol. 1st part 2d of 1817.
	Catalogue Plantarum Americae of 1813.
	Descriptio Phenomenorum Graminum et Plantarum Calamariarum Americae Septentrionalis Indigenarum et Cuncorum 1817.
Dr. Gilchrist,	The Hindoo Universal Atlas.
Chevalier Dias, 12 vol.	Os Lusiadas de Camoens.
Major Gen. Gardiner,	Translation of Trifs on Bridges, &c. Major General Gardiner.
Mons. Langlès,	The Hindoo number of the Monuments anciens et modernes de l'Indoostan.
	Instructions Politiques et Militaires de Tamerlan.



Daphne Gardnori

Andromeda lanccolata

Bramphrand del.

Romani sc.

LIST of DONORS and DONATIONS to the MUSEUM of the *Asiatick Society*,

DONORS.	*DONATIONS.*
J. ADAM, ESQ.	A collection of Minerals and Shells.
THE MOST NOBLE — PRESIDENT,	The Skull of a Lioness.
	Specimens of plants collected at *Bootan*, by Captain W. S. Webb.
	A number of Articles appertaining to Hindoo Mythology, Art of War, &c.
	Specimens of wood, the produce of *Kamaon*, collected by Captain W. S. Webb.
N. ALEXANDER, ESQ.	Specimens of Coral.
Captain BAKER,	Specimens of Javanese Cotton Cloth Manufactures.
	A collection of ancient Chinese Coins.
	Specimens of Minerals from *Rajpootana*, and of Lead-Ore from *Mere*.
ARCHDEACON BARNES,	Piece of a Basaltic Column from *Salsette*, near *Bombay*.
W. B. BAILEY, ESQ.	A number of Spears, *Kreesses*, &c. from *Macassar*.
	A Skull and Skin of the Argali (Ovis Ammon.)
Lt. J. P. BOILEAU,	A number of coins, and a great variety of Brass Images from *Nepal*.
J. BROWN, ESQ.	Coins found at *Tirhoot*.
Capt. W. BRUCE,	Specimen of Sculpture, from *Persepolis*.

APPENDIX.

LIST OF DONATIONS, TO THE MUSEUM, &c.

DONORS.	DONATIONS.
Col. A. Campbell,	Puppets, representing Javanese deities and mythological heroes.
	Stalactite from Java.
Capt. J. Cooper,	An Urn, manufactured from clay, found near *Sadras*.
J. Crawford, Esq.	Stone images found at *Dieyocarta* in *Java*.
G. Cruttenden, Esq.	The skin of a large Snake.
J. DaCruz, Esq.	Some implements of war, used by the Alfoors of *Celebes*.
	Ditto, from the *Malacca* islands.
Gen. Dorin,	Statue of a Hindoo Deity from *Java*.
G. Downinghill, Esq.	An Alabaster Tablet, inlaid with stones in the mosaic manner, from the *Tajat Agra*.
	An Egyptian pebble.
Sir E. Nagle,	A Centipede, preserved in spirits.
Major Fergusson,	The Skull of a *Tapir*.
	The stuffed skins of several animals, of *Mr. Stocca*.
Capt. T. Fraser,	A Javanese plough.
Mrs. Col. Fleming,	Four crystal images from *Nepal*.
Mr. T. M. Fraser,	A fluted bracelet.
Major Gen. [illegible],	A quiver with poisoned arrows from North America.
Humble. E. Gardner,	Specimen of *Nepal* Paper.
W. L. Gibbons, Esq.	A Sea Cockroach.
A. F. Gray, Esq.	A statue of Siva from *Java*.

[illegible]

LIST OF DONATIONS, [illegible] Museum, [illegible]

DONORS.	DONATIONS.
Major [illegible],	Specimen of volcanic Tufa.
Major General Barrowes,	Model of a Cyclopean Filing [illegible]
	Minerals collected by Capt. Lachlan [illegible]
	N. E. frontier of *Bengal*.
Major Hardiman,	Two Persian Coins.
Lieut. Hope,	Some Implements of War, Images &c. from the *Burmah* Empire.
	Some of the Bill Cow of *Africa*.
W. Jones, Esq.	Soil from the district of *Bandelcund*.
Capt. E. [illegible],	Specimens of Soil from *Bandelcund*.
Mrs. [illegible],	A *Malagasse* Spear.
Lieut. [illegible],	Malayan Implements of War, Husbandry &c. Papers of Wearing Cloth, and other articles.
Mrs. [illegible],	The skull of a Unicorn, and part of the head of a [illegible]-horned [illegible].
Dr. [illegible],	Volcanic dust from *Sicily*.
Mr. [illegible],	Specimens of [illegible] clothes.
Col. C. Mackenzie,	Specimens of minerals from *Mysore*.
	[illegible] made of wood, found at *Cre[illegible]* [illegible].
	[illegible] from the [illegible] [illegible] [illegible].
	[illegible]
	Specimens of [illegible].
Mr. [illegible],	Two Sea-snakes, [illegible] *Madras*.
Mr. H. [illegible], K. C.	Coins found near [illegible].

APPENDIX.

LIST of DONATIONS to the MUSEUM.

DONORS.	DONATIONS.
W. Moorcroft, Esq.	The skin of a Pangolin
J. Baillie, Esq.	Various minerals, and fish-bones or petrifactions from *Java*
Lt. C. Paton	The skin of a large Snake
Capt. R. Forbes	Four Spears from the Island of *Engano*
Lt. Fagels	A model for a Carrier Pup, in form
C. M. Rickards, Esq.	Specimens of mineral from various parts of *India*
	The skin of a large *Ganges* Alligator
D. Scott, Esq.	Fossils from the *Curybarrie* Hills
Lt. Dowdeswell	The horn of a Rhinoceros, from *Sumatra*
G. L. Simons, Esq.	A Canoe, and some Spears and other articles, from the Island of *Engano*
	Several weapons from *Sumatra*
Hon. A. Stuart	Specimens of bones of great length, from *Nepal*
Major G. Stuart	Some *Nepalese* arrows, from Capt. B. Latter
Lt. R. Walker	A Sea-snake
	Models of Boats used in the *Persian Gulph*
	A Sarcophagus from the vicinity of *Bajaure*
Major G. St. Tucker	A complete suit of *Indian* Armour
Miss [illegible]	A number of models of Machinery used by the natives of *India*
Dr. [illegible]	A great variety of Articles, illustrative of the Mythology, Antiquities and Literature of Tibet and Central *India*
	Specimens of Shells, and Indian Pottery

[illegible]

[illegible]	[illegible] from the [illegible] of [illegible]
[illegible]	[illegible] of [illegible] and [illegible] Paper
[illegible]	Specimens of Corn from [illegible]
	[illegible] from the [illegible] of [illegible]
[illegible]	Several [illegible]
[illegible]	[illegible] Cave.
[illegible]	[illegible] from the Island of Enguin
W. S. [illegible]	[illegible] and [illegible] of the [illegible]
	[illegible] of the Bear King, from [illegible]
	[illegible]
	[illegible] in the [illegible]
	Fragments [illegible] from
	a temple near [illegible]
	A Scythian [illegible]

I.

Account of the measurement of an Arc on the Meridian, extending from Latitude 15° 6′ 0″,2 to Latitude 18° 3′ 45″, being a further continuation of the former Arc, commencing in Latitude 8° 9′ 38″.

BY LIEUT. COLONEL WILLIAM LAMBTON,
33rd REGIMENT OF FOOT.

MY last communication to the *Asiatick* Society gave an account of the meridional operations comprehended between the station of observation in *Coimbetoor*, and that near *Gooty*, giving an arc whose amplitude was 4° 6′ 11″.28 which being added to the former arc extending from the same station (*Putchapolliam*) in *Coimbetoor*, to the station of observation at *Punnae* near *Cape Comorin*, gave altogether an arc of 6° 56′ 21″.82. The arc which is the subject of this paper, commences at the station of observation at *Nainthabad*, near *Gooty*, and

terminates at another station of observation near *Daumergidda* in the Nizam's dominions, as high as the latitude 18° 3′ 23″.58, being an increase of 2° 57′ 23″.32, and making in the whole an arc of 9° 53′ 45″.14 in amplitude, the largest that has ever been measured on the surface of this globe. The great extent of these operations, together with the consistency of the results, will, independant of any foreign measurements, be competent to establish the elliptic hypothesis with respect to the figure of the earth. And that this may be done in the most satisfactory manner, I have contrived to make the length of this section such, that its middle point may be as near the latitude of 16° 34′ 44″ as possible, because the middle point of the first section falls in 9° 34′ 44″; so that in calculating the successive degrees according to the elliptic theory, the computed and measured degrees may be compared.

In my last, it appeared that the mean length of the degree due to the latitude of 11° 37′ 49″, the middle point between *Punnae* and *Namthabad*, was 60480,3 fathoms. Since that paper was sent, there has been a small correction applied to the base near *Gooty* after comparing the chains with the brass standard scale as will appear in the detailed account of that delicate operation. This correction has somewhat increased the meridional distance between that base and *Ferracondah* south, and consequently the whole terrestrial arc between *Namthabad* and *Punnae* is also increased; which now gives the degree due to latitude 11° 37′ 49″ equal 60481.55 fathoms. However as there are now three sections, whose respective middle points lie in 9° 34′ 44″; 13° 3′ 55″ and 16° 34′ 44″; I have thought it best to take the degrees due to these latitudes, as deduced from actual observations, using each, *first*, with the *French* measure, *then*, with the *English* measure, and *lastly*, with the *Swedish* measure; and thence obtaining a *general mean* ratio of the polar axis to the equatorial diameter.—The *first* mean of these three

agree due to latitude 9° 34′ 44″ and in *that* due to latitude 16° 34′ 32″, (which will according to this alteration come out 60507,19 fathoms) may be determined. And it appears that the first is 23 fathoms in defect, and the other 5,55 fathoms nearly, in excess; both very small quantities, the greatest being less than $\frac{1}{3}$ of a second on the earth's surface.

With respect to the compression, it is impossible that $\frac{1}{304}$ can be very far from the truth, since the whole of the measurements which are entitled to the greatest confidence, are taken into account. The *French* mathematicians, by using Bouguer's measurement at the Equator with their own, have found the compression to be $\frac{1}{334}$ nearly. But if these *Indian* measurements be correct, Bouguer's degree at the equator is 23 fathoms in excess. I have the higher opinion of that sagacious observer, who appears to have been the most correct of all the academicians sent out at that time, and the only one apprized of the effect of local attraction on the plummet. But to observe in so mountainous a country, and with an instrument far inferior to those now in use, an error of that magnitude is not to be considered as surprising; yet it will make a considerable difference in the compression. The celebrated La Lande in all his astronomical observations, where the figure of the earth was concerned, invariably used $\frac{1}{310}$; and if this be taken in computing the precession of the equinoxes, and the effect of solar nutation, the theory will very nearly agree with observation. The compression is an element of very general importance in the higher branches of physical astronomy; and it is gratifying to think that the quantity deduced from these recent combined measurements is nearly that which has been adopted by the ablest astronomers, to make the theory agree with observation.

degrees used with the *French* degree gives that ratio as 1: 1.0034295. The *second* mean of the same three degrees used with the *English* degree gives it as 1: 1.0031913; and the *third* mean of the same three degrees used with the *Swedish* degree gives it as 1: 1.00324179, and the mean of these three means gives the ratio of the polar to the equatorial diameter as 1: 1.0032896, or the compression at the poles $\frac{1}{304}$ or $\frac{1}{64}$ very nearly: and this ratio has been finally adopted for computing the general scale of degrees both of latitude and longitude, and also of the degrees perpendicular to the meridian, from the equator to the pole.

It is well known to mathematicians, that if a meridian of the earth be an ellipse, whatever may be the compression at the poles, the increments to the first degree of an arc on that meridian to make it equal to any other degree north from it, will always be as the increment to the square of the latitude of that distant degree, above the square of the latitude of the first degree.—That these *Indian* operations may rest entirely on themselves, I have adopted this method for computing a succession of *nine* degrees, beginning with the degree in latitude 9° 34′ 44″, which is 60472,83 fathoms. The *eighth* of these degrees falls in latitude 16° 34′ 44″, and is 60509.12 fathoms.—Now the degree due to latitude 16° 34′ 42″ as determined by the measurement is 60512,78 fathoms, so that there is only a difference of 366 fathoms, a quantity too inconsiderable to affect the elliptic hypothesis.—This is supposing the degree in latitude 9° 34′ 44″ to be right, in which case the compression at the poles would be $\frac{1}{185}$ nearly. But if the compression $\frac{1}{304}$, as deduced from the *general* mean be supposed correct, and the degree in 9° 34′ 44″ increased to 60475,13 fathoms (see Art. 16,) the next degree in 10° 34′ 44″, will be 60478,72, and these used will give the compression $\frac{1}{304}$ nearly: so that by this method, the *errors* in the

In order to do every possible justice to this important subject, in place of the measurement of degrees due to any particular latitudes, I have used the two longest arcs, viz. the one which I have here given an account of, and that measured by DE LAMBRE and MÉCHAIN between *Dunkirk* and *Barcelona*. The first being 598610 fathoms, corresponding with a celestial arc of 9° 53′ 45″ 13‴; the other 587987 fathoms, corresponding with an arc of 9° 40′ 12″ 2; with these I have investigated the compression by a method similar to that given by Professor PLAYFAIR in the 5th Vol. *Edinburgh* Philos. Transactions. This method with very long arcs, such as those, one would imagine must afford surer results than by taking single degrees due to particular latitudes, where there is much irregularity in their succession, as is the case with the *French* measurements. The compression brought out by this method (see Art. 18) is $\frac{1}{300}$ nearly, which differs very considerably from what is brought out by the aforesaid general mean; and what is singular, it is nearly the same as that given by taking the degree in 9° 34′ 44″ equal 60472,83 fathoms, and the one in 10° 34′ 55″ equal 60476,89 fathoms, and where the degree in latitude 16° 34′ 42″ by observation, only differs 3,66 fathoms from the computed one. I have however, for reasons already given, abided by the compression $\frac{1}{300}$ as brought out by the general comparison.

THIS meridional series, which commences at the base near *Gooty*, is terminated by another base in latitude 18° 2′ nearly, which has been measured with more than ordinary attention; and besides the stars observed at *Daumergidda* for comparing with those observed at the southern stations, several others have been selected for extending the celestial arc several degrees further to the northward, should time and circumstances prove favorable for that purpose. However, should this

never happen. I am of opinion, that sufficient has been done for establishing the point in question, viz. the elliptical figure, and dimensions of the earth, the great objects of all the meridional operations, especially those recently performed, which in grandeur and accuracy must be allowed to exceed any thing of the kind recorded in the history of practical science. The great excellence of the instruments now in use is the chief cause of this superior accuracy; and it is by that same excellence that irregularities have been discovered which former observers were not aware of, and therefore not prepared to guard against; and the universal principle of attraction, which has long been established, is now found to affect the plummet of a zenith sector, and where there is any unequal force acting in the direction of the meridian, occasioned either by mountains or by different densities of the strata lying to the north and south of the station of observation, the plummet of the sector will be drawn from its vertical position. The *French* and *English* operations have been considerably disturbed by this invisible agent; for so it may be termed, when no mountains are near; and my former observations at *Dodagooniah*, *Bomasundrum*, and *Paughur* have witnessed its effects. Having however, left our those stations altogether, the observations at *Punhal*, *Putchapolliam*, *Nainthabad*, and *Daumergidda*, appear to have been entirely free from any anomaly, a circumstance which must give a preference to these extensive operations over any of the present day.

After having determined the ratio of the polar axis to the equatorial diameter, their actual lengths are thence obtained, and finally the length of the quadrantal arc of the meridian, from which the *French* mathematicians have deduced their standard, the 10,000,000th part of which are reduced to inches, being their *metre* or *unit* of measure. The measure of the *metre* here brought is 39,37,08 *English* inches at the

temperature of 62°, which is within $\frac{1}{10}$th part of an inch of what the *French* measure will be, when reduced to the same temperature; a quantity altogether insensible.

HAVING brought these meridional operations to so successful a conclusion, it may not be altogether out of place to give some account of the still more extensive geographical ones, of which these have been a principal foundation.—The whole of the peninsula is now completed from *Goa* on the west, to *Masulipatam* on the east, with all the interior country from *Cape Comorin* to the southern boundaries of the *Nizam's* and *Marhattas'* territories. In that great extent of country, every object that could be of use in geography, or in facilitating the detailed surveys of the provinces, has been laid down with precision.—All the great rivers sketched in, in a general manner, and all the great ranges of mountains slightly depicted. The latter part of the survey which takes in the northern part of the peninsula between the latitude of 14°, and southern frontiers of the foreign dominions, has been attended with peculiar success, and the districts of *Nellore*, *Guntoor*, *Palnaud*, the ceded districts, the *Mysoor* to the north of 14°, the *Soondah* country, and the district of *Goa*, are covered with a net of triangles without a single break. The districts of *Soondah* and *Goa* have been surveyed by Lieutenant GARRING, of the *Madras* establishment, who has in his possession a fine instrument made by CARY; and such was my opinion of his accuracy and judgment, that I requested to be furnished with his triangles to include in my general report; and the near coincidence of the sides common to both surveys, has proved that my confidence was not misplaced.

MY excursion into the *Nizam's* country was for the sole purpose of getting three degrees more to the arc, and it was with some hes-

tion that I entered it at all, from being apprehensive of interruption occasioned by the jealousy of the inhabitants: but all impediments have been removed by the truly liberal support which I have met with from Mr. Henry Russell, the Resident at the *Nizam's* court, who as a man for promoting useful science, has added a spirit of national pride in forwarding the object of my labours.—By his good offices every appearance of difficulty has vanished; and it is but just to say thus much as a tribute due to his kind and friendly attention.—I at first indeed experienced some delays when my signal flags were sent forward, and that from not knowing in what district they might fall; but when that happened, an order from the jaghiredar was instantly procured by the minister, and the difficulty removed.—But when it became generally known that I was not surveying their little districts, the alarm ceased, and I met with the same willingness to assist, as I found in every other part of the peninsula, especially among the *Gentoo* inhabitants. The most serious impediments that I shall apprehend to the northward will be from the gangs of plunderers, which infest that quarter when the Army is not in the field.—It will however be a desirable object towards promoting general geography, as well as for giving a basis for local surveys, to extend this work as far to the northward as possible, and to enlarge it, as is intended, so as to take in all the great military roads leading from the ceded districts to *Jaulna*, *Ellichpoor*, *Nagpoor*, &c. and when this shall be completed, and the triangles extended from *Mylapatan* to *Point Palmiras*, all which is a part of the work before me, I trust that I shall have contributed my share towards the advancement of *indian* geography. Should I live to accomplish all this, there will then be, besides the great extent of territory already co-ordinated, a foundation laid for extending this survey over the whole of the [illegible], through *Orissa* and the more northern provinces, through the *Marhatta* dominions, and finally, into the upper districts of *Hindostan*, and [illegible]

cerely hope, that after I relinquish it, some one will be found possessing zeal, constitution, and attainments wherewith to prosecute it on the principles already followed.—It would indeed be gratifying to me if I could but entertain a distant hope, that a work which I began, and which will then be brought to so considerable a magnitude, should at some future day be extended over *British India*.

W. LAMBTON.

HYDRABAD, *September* 15, 1815.

I.—*COMPARISON OF THE CHAINS, WITH THE BRASS STANDARD.*

PREVIOUS to giving any detailed account of this section of the arc, it will be proper to observe, that it became necessary to make some correction in the length of the base near *Gooty*, on account of an irregularity that was discovered in the standard chain, or rather in the comparative lengths of the two chains. It may be remembered that one of the chains in my possession has always been applied as a standard chain, and having been sent out new in 1802, I have kept it carefully laid by, thinking that while it was clean and never used as a measuring chain, its length would remain invariable; and the comparative lengths of the two chains seemed to be perfectly regular, allowing for the wear of the measuring chain, till previous to measuring the base near *Gooty*.—At the conclusion of the base near *Palamcottah*, the excess of the measuring chain above the standard one

was 39.04 divisions of the micrometer head, an excess which I thought rather great, but as there had been a small base measured on the surface of the ground near *Tanjore*, and the recent experiments made with great care, I rested satisfied, though the increase for the measurement was much greater than usual, being 9.38 divisions. I was however much surprised on comparing them previous to the measurement near *Gooty*, to find that the excess was only 30.4 divisions, but being 36.3 divisions at the conclusion, I apprehended that there might have been some oversight at *Palamcottah*, or that the standard chain had increased in its length; in order to determine which, it became absolutely necessary to compare it with the *brass standard*, which was done in the following manner.

As I had not the means of procuring a cast iron bar, and executing the measurement after the manner adopted by the late Mr. RAMSDEN, it occurred to me that if upon a fine surface the chain could be extended its whole length, one hundred feet might be measured off from the standard scale at a given temperature, and by accounting for the difference between the expansion of brass and steel, it would be easy to determine whether the standard chain had suffered any alteration in its length.—For this purpose, I built a brick wall upwards of two feet in height, and something more than 100 feet in length, so that a weight post at one end, and a drawing post at the other, might be fixed in the brick work, and the necessary apparatus applied for drawing out the chain.—The upper surface of this wall was made perfectly horizontal by a spirit level fixed on a straight ruler about four feet in length, and then covered with fine chunam mortar, (a celebrated cement in this country) it was polished, so as to resemble a sheet of glass, an operation at which the workmen here are remarkably expert. After this was dry

lected, I placed the transit instrument which is used in laying out the base lines: at a convenient distance from one end of the wall, such that the point of a fine pencil at the nearest end might be distinctly seen through the telescope; and by directing it to the other end, a few trials enabled me to see along the middle of the wall from one end to the other.—After the instrument had been well adjusted, a series of points was then made, about four feet from each other by looking through the telescope, and directing a person with a fine pointed pencil in his hand, to move it until it was brought into the intersection of the wires in the focus of the eye-glass; and in this manner the points were fixed from one extremity of the wall to the other, and a pencil line drawn through them. This being done, brass screws with polished heads about $\frac{1}{10}$ of an inch in diameter, were each screwed fast into a square piece of lead, leaving the brass button about half an inch above it.—The lead was then sunk into the chunam till the brass coincided with the polished surface of the wall, and adjusted by the longitudinal pencil line, and others drawn at right angles to it at certain distances roughly measured by the beam compasses. Of these there were fourteen; viz. five at [illegible] feet distance, beginning with the nearest end, for the purpose of laying off *ten* feet from the brass scale; and then one at every ten feet from the last one, to the completion of the hundred.—All these being fixed *nearly* correct, a fine line was drawn through the whole in the direction of the pencil line already mentioned; on the first of these buttons, a cross perpendicular line was drawn so as to make an intersection with the longitudinal one, and nearly in the center of the brass: this marked the commencement. Every thing being thus prepared and the whole extent of wall shaded by tents, the final measurement was commenced at about the time of sun-rise, on the 24th *March*, 1813, having it strictly in view to perform the whole opera-

tion, during the ſame temperature, which ſeldom varies early in the morning for an hour and a half, and this morning happened to be particularly favorable.

Two feet and a half were then taken off from the braſs ſtandard with the moſt ſcrupulous exactneſs, after examining with magnifying glaſſes the points of the compaſſes, one perſon keeping one of the points carefully fixed to a line on the ſcale, while the other adjuſted the oppoſite point by the ſcrew at the end of the beam.—After being ſatisfied as to the accuracy of this diſtance of 2½ feet, one point of the beam compaſſes was fixed on the point of interſection which marked the commencement, while the other point was drawn acroſs the line on the next braſs button, making a point of interſection. The beam compaſſes were then removed to the next button, and ſo on till ten feet were meaſured off. A long beam was then uſed, and the points with apparatus fixed on it, and adjuſted to that ten feet; and in a manner ſimilar to what has already been deſcribed, the remaining ninety feet were meaſured off and a fine perpendicular line drawn through the laſt point of interſection. As there was full time to repeat the operation, the meaſurement was carried back from point to point, when an exact coincidence was obſerved.

The chain, which, with five thermometers, had been lying cloſe to the wall all night, was then extended at full length; the weight applied, and the arrow at the oppoſite end brought to coincide with the commencement of the meaſured line while the whole chain was adjuſted by the pencil line drawn along the ſurface of the wall; and after allowing ſome minutes for the weight to act freely, the length of the chain was then examined, and found to exceed the braſs meaſure by 0,0341 inches.

This chain was then taken aside, and the measuring chain which had [illegible] alone with the other, was compared with the measurement, and exceeded it by 0,2297 inches. This chain was put aside and the standard chain a second time applied, and the arrow coincided with the same mark. The measuring chain was also compared a second time but there appeared no sensible difference. From the comparison of the two chains, it appears that ,2297—,0341=,1956 inches, or ,0163 feet, is the excess of the measuring chain above the other. The whole of these operations were begun and completed while the mean temperature given by the five thermometers, was 72°.

Now the expansion of 100 feet of brass due to one degree of temperature exceeds the expansion of the new chain (according to former experiments) due to one degree temperature, by ,00495 inches, and the same chain measured exactly 100 feet by the brass standard in *London* at the temperature of 50°: therefore (72°—50°)×,00495 gives ,1089 inches which the chain ought to have fallen short, had there been no alteration in its length. But it exceeded the brass measure by ,0341 inches, therefore ,1089+,0341 or ,143 inches=,0119 feet, is what the chain has lengthened, and this quantity would be sensibly the same, were the chain compared with the brass standard at the temperature of 50°, for ,0119 feet of steel for 22° of change in temperature would only be contracted ,0000016 feet, a quantity altogether insensible. Hence the standard chain from this measurement may be considered equal 100,0119 feet at the temperature of 50°.

In the latter end of October 1814, about 19 months afterwards, another comparison was made with the brass standard at *Hyderabad* and in order to ensure still greater accuracy, instead of using magnifying glas-

ter for applying the points of the beam compasses, [illegible] microscopes belonging to the circular instrument were each placed [illegible] a tripod with short adjusting screws for feet, so as to raise or lower the microscope for obtaining distinct vision. The brass standard scale in its mahogany bed was then placed on the table resting on two pieces of very thin board, each having two flat pieces of wood screwed on it at such a distance as to receive easily the mahogany bed; and these four pieces were of such a thickness, that their surfaces coincided with the surface of the brass scale. They were then moved to a convenient distance for measuring off $2\frac{1}{2}$ feet, and the microscopes placed upon them and brought over the required divisions on the scale, and adjusted by the feet of the tripod to distinct vision. The beam compasses were then laid on the scale, and the points brought by the hand to be nearly $2\frac{1}{2}$ feet asunder, and afterwards fixed with care and accuracy by the adjusting screw at one end of the beam. This being done, the process was precisely the same as in the experiments at *Bellary* having the wall, brass buttons, &c. in all respects the same when one hundred feet was measured off. The chains were compared as in the former experiments, but to read off the difference between the chain and the brass measure, one of the microscopes (B) with its micrometer was made use of, and the scale with its bed was placed in the same manner as when the $2\frac{1}{2}$ feet were measured off. The microscope was then placed on the wood and the scale moved until the small divisions at its commencement were brought under the microscope, the adjusting feet of the tripod being moved if necessary, and distinct vision obtained. These divisions are each $\frac{1}{20}$th of an inch; that is, half an inch is divided into ten parts. The microscope was then brought over the first of these parts, and the wires of the micrometer being placed at right angles to the longitudinal line on the scale, they were separated and made to embrace one of these divisions,

So that the length of the chain is now [illegible] FEET 100,01380

Oct. 22d.—The brass measure was made at the temperature of 65°, but the chain was compared at the temperature of 67°, and exceeded by 24,4666 r. or [illegible] 0,13285

But 2° × ,00742 inches or 0,1484, in which the chain had lengthened since the brass measure was laid off [illegible] 0,14184

The difference of which is the excess of the chain at the temperature of 65° or [illegible] INCHES ,11[illegible]

To which add 15° × ,00495, inches, or [illegible] ,074225

Their sum will be what the chain has lengthened, or [illegible] ,19226

Hence the length of the chain is [illegible] FEET 100,0[illegible]

Oct. 23d.—The brass measure was laid off, when the temperature was 65,1° and the chain was compared when the temperature was 65,7°, and then exceeded the 100 feet by 20,8966 r. or [illegible] 0,11344

From which deduct 0,6° × ,00742 inches, or [illegible] 0,00445

The difference is the excess at the temperature 65,1° [illegible] 0,10899

To which add 15° × ,00495 inches, or [illegible] ,07474

The sum is what the chain had lengthened [illegible] 0,18373

And the length of the chain is [illegible] 100,01531

Hence we have the length of the standard chain as follows:

By comparison, 21st, at 65,1° temperature [illegible] 100,01580

22d, at 65,[illegible]° [illegible] ,01602

23d, at 65,1° [illegible] ,01532

Mean, or length at temperat. 65, 07°. [illegible] feet 100,01571

The micrometer head was then turned so as to bring the wires to coincidence, and the revolutions of the head and the parts of a revolution were noted down. This was done to each of the ten divisions, and a mean taken, which gave 18 revolutions and 50 parts for the measure of $\frac{1}{10}$th of an inch.

The microscope was then taken to the opposite side of the scale where every inch is divided into *ten* parts, and each of these being measured after the above manner, the whole gave a mean of 18 revolutions, 50 parts to $\frac{1}{10}$th of an inch. Now each of these

	INCHES.
revolutions is 120 parts, so that by allowing 18 r. 50 p. to -	0.10000
We have 1 revolution or 120 parts - - -	0,00545
1 part or $\frac{1}{120}$th of a revolution - - - -	0,000045

This account of the process and arrangement being premised the results of the experiments made on the 21st, 22d and 23d October were as follows:

Oct. 21st,—*One hundred feet* of brass measure was laid off from the scale in the temperature of 65, 1° and the standard chain was applied at *the same temperature*, when the *excess* of the chain

	INCHES.
above 100 feet of brass was 21,3583 r. equal - -	,11598
And since 100 feet of brass expands more than 100 feet of steel by ,00495 to 1° of temperature, and the chain coinciding with the brass measure at the temperature of 50°, we have 15°.1×,00495 inches, or - - - -	0,07474
Which the chain ought to have fallen short, had there been no wear, but as the chain exceeded it by - - -	0,11598
Their sum is, what it has lengthened - - - -	0.19072

And this may be called the measure at the temperate 50.°

Now to have the excess of the old chain above the standard one by these experiments, it was observed that on the 21st, the *standard* chain exceeded the brass measure by . . . 0,11598

And the *measuring* one by . . . 0,32797

The difference is therefore the excess of the measuring standard chain . . . 0,21199

On the 23d, the standard chain exceeded the brass measure at the temperature 65,7° . . . 0,11344

And the measuring chain exceeded at the temperature of 66,25° by . . . 0,32701

Difference is the excess of the measuring chain above the standard one . . . 0,21357

From which deduct 0°,55+,00742, or . . . 0,00408

The difference will be the excess at 65°,7 temperature . . . 0,20949

Excess on the 21st . . . 0,21199

Mean of these two in inches . . . 0,21074

In making these allowances for the change of temperature after the brass measure was laid off, it is presumed, that in so short a time the brick wall, which was shaded by the tents, could not have suffered any change, especially as the alteration in temperature was so trifling.

From comparing what the chain had lengthened by these last experiments, with what it had lengthened by those made at *Bellary*, it appears that in that interval of time, or nineteen months, it had increased 0,04608 inches, or 00384 feet, so that if we suppose the increase to be regular, it would have encreased from before the measurement at

Gooly, to the line of the experiments at *Bellancottah*, which was a line in the above rate ,00,8 feet, which deducted from 100,1169 feet, the length by the experiments at *Bellancottah*, we shall have the difference equal 100,1161 feet, and therefore 100,0961 feet for the length of the standard chain previous to the measurement near *Gooly*, to which add ,00,8 feet, which was the excess of the measuring chain above the other at that time, the length of the measuring chain was then 100,0928 feet, and that multiplied by 242, the number of chains measured, will give 22606,2853 feet, for the apparent length of the base. But this is supposing the increase in the length of the standard chain to be uniform which cannot have been the case, because ,1574 feet the excess of the standard chain above the brass measure in 1815, divided by 13, the number of years it has been in my possession, will only give ,0012 feet for each year, which is only half of what is deduced from the above rate, of ,00,8 feet for two years. It is therefore more probable that for some years after the chain was in this country, it had remained unchanged, and that when the rust began to operate, it had lengthened rapidly, but where to mark the commencement it is impossible to say, unless we date it about the time when the irregularity was noticed in the comparative lengths, that is in the interval between the conclusion of the base near *Bellancottah*, and the commencement of that near *Gooly*, and in order to make a correction, the most probable means will be to suppose that the standard chain had lengthened those divisions which appeared to be defective in the excess of the measuring chain when the comparison was made, previous to the measurement near *Gooly*, viz. 8,63 divisions. No. 8,63 divisions is equal to ,00345 feet, therefore if we suppose this to be the *only* lengthening from the rust, and that the measuring chain had lengthened from *use* only, we must in that case call the standard chain 100,0961 feet, and this at the temperature of

50°, because the quantity ,00345 feet could not be sensibly affected by any change of temperature. Then if to the above be added the excess of the measuring chain above the other, that is ,01218 feet, and the whole multiplied by 326, we shall have the apparent length of the base in this case 32605,0954 feet, which is most probably nearer the truth than the former allowance which gives the apparent length 32606,2853 feet, for if this be made use of, with its corrections, to compute back to the base near *Bangalore*, it would bring out that base upwards of two feet more than it measured, which would indicate that there must have been an excess in the standard chain, above 100 feet, as far back as 1804, which is not probable, if it has been correctly laid off in *London*.

Taking therefore all these circumstances into consideration,

we will take the apparent length of the base near *Gooty*	32605,0953
The correction for the wear equal - -	+0,3879
The correction for reducing the base to the horizontal distance will be - - - - -	—0,4368
Hence the apparent horizontal distance will be - -	32605,0464
The correction for the expansion and reduced to the standard temperature of 62° - - -	+5.4429
Hence the correct measure of the base - -	32610,4893
Which being reduced to the level of the sea -	32608,6446

TRIANGLES *depending on the Base near Gooty, and carried northerly to the distance between Darroor station and Kabgutt station.*

2. ANGLES.

At the North end of the Base (near Gooty.)

BETWEEN	AND	°	′	″	
South end of the Base	Gooty-drcog station	87	27	16".5	
				21.5	
				20.5	
				17	
				15	16.45
				16.5	
				15	
				14	
				13.5	
				15	
	Boglemanricondah	105	36	22.5	
				22	25.25
				27	
				29.5	
	Paumdy station	85	4	0	
				1	
				2	
				4	
				3	2.45
				0	
				0.5	
				1.5	
				0	
				7.5	
Boglemanricondah	Bolecondah	51	14	22.5	
				20.5	
				21.5	1.30
				22	
				19.5	
				30	
Boglemanricondah	South end of the Base	105	4	2.25	
South end of the Base	Paumdy hill	36	4	2.45	

At the North end of the Base (continued.)

BETWEEN	AND			
Paumdy hill,	Boglemauricondah,	[illegible]	32	22.8
Boglemauricondah	Boleecondah,	51	[illegible]	24.8
Boleecondah,	Paumdy station,	121	26	47.13

At the South end of the Base near Gooty.

North end of the base	Gootydroog	97	18	59	
				67.5	
				69	
				70.5	
				58.5	
				64.5	62.64
				65.5	
				64	
				55.5	
				56.5	
				58.5	
	Paumdy Hill	105	8	9.5	
				4	
				5.5	
				2.5	6.43
				9	
				8.5	
				6	
Paumdy Hill	Boglemauricondah	64	24	37	
				84	
				34	
				51	43.61
				49.5	
				51	
				48	
North end of the base	Paumdy hill	105	8	6.43	
Paumdy hill	Boglemauricondah	64	24	36.64	
Boglemauricondah	North end of the base	4	32	20.79	

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At Gooty Station.

BETWEEN	AND				
North end of the base	South end of the base	65	18	48	
				35.5	
				44.5	
				47.5	
				47	
				47	41.19
				39	
				38	
				33	
				42	
				32	
Paumdy	Guddacul station	67	2	57	
				69	56.17
				52.5	
Guddacul	Koclacondah	77	47	72.5	
				64	
				58.5	65.4
				74	
				58	
North end of the base	Namthabad	2	31	59.5	
				57	
				57.5	58.5
				60	
Paumdy station	South end of the base	21	16	32.75	
				37	
				36.5	32.65
				32.5	
				27.5	

South end of the base	North end of the base	65	18	41.19
North end of the base	Namthabad	2	31	58.5
Namthabad	South end of the base	87	50	39.69
South end of the base	Paumdy hill	21	16	32.65
Paumdy	Namthabad	46	34	7.04

At Boglemauricondah.

BETWEEN	AND				
North end of the base	South end of the base	89	66	14	
				12.5	
				8.5	
				12.5	12.5
				14.5	
				14.5	
				10.5	
				18	
North end of the base	Boleccondah	72	55	4.5	
				5.5	
				9.0	
				5.5	
				6	7.21
				6	
				6	
				7.5	
				11.5	
	Paumdy hill	65	1	33	
				32.5	31.25
				25	
				34.5	

At Paumdy hill.

North end of the base	South end of the base	89	52	55.5	
				54.0	
				50.5	
				50	52.21
				50	
				53	
				52.5	
South end of the base	Gooty station	26	26	15	
				14.5	
				18	
				19	17.56
				18.5	
				17	
				20	
				18.5	

At Paumdy continued.

BETWEEN	AND	°	′	″	
Gooty ſtation	Boglemauricondah	57	52	39	
				46	
				42.5	42.5
				44	
				42	
				41.5	
	Boleecondah	40	44	9.5	
				10	
				12.5	
				12	21.26
				16	
				17	
				2.5	
	Namthabad ſtation	13	55	28.14	
				28.14	
				30.14	28.65
				28.69	
				28.14	
Gooty ſtation	Guddacul ſtation	88	42	29	
				29	
				27.5	
				27.5	
				28.5	30.5
				29.5	
				35	
				35	
				37	
N. end of the baſe	S. end of the baſe	89	52	52.21	
S. end of the baſe	Gooty ſtation	26	26	17.56	
Gooty ſtation	N. end of the baſe	13	26	34.65	
	Boglemauricondah	57	52	42.5	
Boglemauricondah	N. end of the baſe	44	26	7.[illegible]	
Boleecondah	Gooty ſtation	40	44	11.[illegible]	
Gooty ſtation	N. end of the baſe	13	26	34.65	

At Paumdy (continued)

FROM	TO	°	′	″
N. end of the base	Boleecondah	27	17	36.71
Guddacul station	Gooty station	88	42	20.5
Gooty station	Boleecondah	40	44	11.36
Boleecondah	Guddacul station	47	58	19.14

At Boleecondah.

FROM	TO	°	′	″		
N. end of the base	Boglemauricondah	55	60	24.5		
				24		
				27		
				25.4		
				29.5	29.28	
				30		
				27		
				38.5		
				38.5		
Boglemauricondah	Paumdy hill	1	24	54	48.5	
					53.	
					48.5	
					55.	
					53.5	58.25
					53.5	
					56.5	
					57.5	
Paumdy hill	Guddacul station	94	18		54.5	
					58.5	
					58.	
					57.	55.67
					54.5	
					56.5	
Guddacul station	Kuelacondah	184	16		5.5	
					4	
					0	
					11.5	5.42
					10	
					0	

At Bolecondah (continued.)

BETWEEN	AND	°	′	″
North end of the base	Boglemauricondah	55	50	89.25
Boglemauricondah	Paumdy hill	24	54	68.25
Paumdy station	North end of the base	30	55	36.95

At Cuddacul station.

Paumdy hill	Gooty station	24	14	38.5	36.17
				83	
				85	
				40	
				37	
				38.5	
Gooty station	Koelacondah	30	12	35.5	46.63
				34	
				55	
				47.5	
				54	
				54.5	
				39	
				45.5	
Bolecondah	Koelacondah	17	9	29.5	31
				31	
				32.5	
Koelacondah	Arrakerrabetta	70	40	28.5	38.37
				29.5	
				35.5	
				40	
Paumdy hill	Gooty station	24	14	36.17	
Gooty station	Koelacondah	30	13	45.63	
Koelacondah	Paumdy hill	54	27	22.80	
	Bolecondah		9	31	
Bolecondah	Paumdy hill	87	17	60.00	

At Koelacondah (continued.)

BETWEEN		AND		°	′	″	
Adonidroog	....	Poolycondah		40	27	42	
						45	
						44.5	
						47	40.5
						39	
						36	
						34.5	
						36	
Gootydroog	....	Guddacul station	....	71	53	11.15	
Guddacul	....	Arrakerrabetta	....	41	15	30.14	
Arrakerrabetta	....	Gootydroog	....	113	14	41.29	
Arrakerrabetta	....	Adonidroog	....	33	10	39.14	
Adonidroog	....	Poolycondah	....	40	27	40.5	
Poolycondah	....	Arrakerrabetta	....	73	38	19.64	

At Arrakerrabetta.

Guddacul	....	Koelacondah	....	68	3	68	
						56.5	
						53	59.75
						61.5	
		Gootydroog		46	52	53	
						58.5	
						63	
						49.5	58.07
						50	
						51	
						46.5	
Koelacondah	....	Poolycondah	....	20	49	34.5	
						27.5	
						42.5	36.4
						41.5	
						41	

At Arrakerrabetta (continued.)

BETWEEN	AND				
Poolycondah	Gootydroog	42	0	8.6	43.8
				49.5	
				49	
				43.5	
				37.5	
	Adonidroog	61	16	17	19.75
				16	
				21	
				22.5	
				24.5	
				17.5	
Guddacul	Koelacondah	68	8	59.75	
Koelacondah	Poolycondah	20	49	86.4	
Poolycondah	Guddacul	88	58	85.15	
Guddadul	Gootydroog	46	52	58.07	
Gootydroog	Poolycondah	42	0	42.08	
Ditto	Ditto (observed direct)	42	0	43.10	
	Mean	42	0	42.59	

At Poolycondah.

Arrakerrabetta	Koelacondah	85	82	5.5	6.67
				11	
				8.5	
				8.5	
				5	
				6.5	
Koelacondah	Gootydroog	[illegible]	[illegible]	28	28.67
				29	
				22	
				17	
				24	
				22	
Arrakerrabetta	Adonidroog	81	19	9.5	4[illegible]
				2.5	
				8.5	
				8.5	
				2.5	

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At Kerra Bellagul.

BETWEEN	AND			
Adonidroog	Poolycondah	53 44	63 5	
			58.5	
			61.5	
			63 5	
			56	59.94
			58	
			63	
			56.5	
			59	
	Malliabad	68 12	52	
			65	
			56	
			49.5	
			49	52.78
			48	
			51	
			56	
			58.5	
Malliabad hill	Darroor hill	41 35	35	
			32	
			36	
			38	34.48
			32	
			33.5	
			34	

At Malliabad hill.

Adonidroog	Kerra Bellagul	58 1	21	
			18.7	
			20.7	
			18	
			20.7	
			14.5	17.61
			9.5	
			16.2	
			18	
			18	
			19	
			17	

N. end of the base from Boglemauricondah = 37929.3 feet.

Number.	TRIANGLE.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	N. end of the base,	70 32 22.80	−0.10			70 32 22.2	
	Boglemauricondah,	65 1 31.25	−0.14			65 1 30.6	
5	Paumdy hill,	44 26 7.85	−0.12			44 26 7.2	
		180 00 7.90		0.42	+3.48	180 00 00.0	
	Paumdy hill from					N. end of the base,	49110.9
						Boglemauricondah,	51081.7

N. end of the base from Bolecondah = 43814.8

Number.	TRIANGLE.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	N. end of the base,	121 46 47.13	−0.45			121 46 46.7	
	Bolecondah,	30 55 36.03	+0.02			30 55 36.5	
6	Paumdy hill,	27 17 36.71				27 17 37.2	
		179 59 59.87		0.43	−0.56	180 0 0	
	Paumdy hill from					N. end of the base,	49107.4
						Bolecondah,	81225.7

Gooty station from the S. end of the base = 35833.8

Number.	TRIANGLE.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Gooty station,	67 50 39.69	−0.04			67 50 39.7	
	S. end of the base,	27 14 2.64	−0.03			27 14 2.6	
7	Namthabad station,					84 55 17.7	
						180 0 0.0	
	Namthabad station from					Gooty station,	16472.3
						S. end of the base,	33337.3

Gooty station from Paumdy hill = 59571.6

Number.	TRIANGLE.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Gooty station,	46 34 7.04	+0.06			46 34 7.1	
	Paumdy hill,	13 55 28.65	−0.03			13 55 28.6	
8	Namthabad station,					119 30 24.3	
						180 0 0	
	Namthabad station from					Gooty station,	16472.1
						Paumdy hill,	49708.1

N end of the base from Paumdy hill=49110.8 feet.

Number.	TRIANGLES.	Observed Angles.	Differences	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	N. end of the base,	121 46 47.18	−0.45			121 46 46.7	
	Paumdy hill,	27 17 36.71				27 17 37.2	
9	Boleecondah,	30 55 36.03	+0.02			30 55 36.1	
		179 59 59.92		0.43	+0.51	180 0 0.	
	Boleecondah from					N. end of the base,	43818.2
						Paumdy hill,	81231.8

Boleecondah from Paumdy hill=81228.75.

Number.	TRIANGLES.	Observed Angles.	Differences	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Boleecondah,	94 43 55.67	−1.04			94 43 53.5	
	Paumdy hill,	47 58 19.14	−0.43			47 58 17.	
10	Guddacul hill,	37 17 50.8	−0.44			37 17 49.5	
		180 0 5.61		1.91	+3.70	180 0 0.	
	Guddacul from					Boleecondah,	99575.5
						Paumdy hill,	133595.5

Paumdy hill from Guddacul=133595.5.

Number.	TRIANGLES.	Observed Angles.	Differences	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Paumdy hill,	88 42 30.5	−0.91			88 42 29.5	
	Guddacul hill,	24 14 36.17	+0.48			24 14 35.5	
11	Gootydroog,	67 2 56.17	−0.50			67 2 55.	
		180 0 2.84		1.89	+0.95	180 0 0.	
	Gootydroog from					Paumdy hill,	59571.6
						Guddacul hill,	145043.8

Guddacul station from Gootydroog=145043.8.

Number.	TRIANGLES.	Observed Angles.	Differences	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Guddacul,	30 12 45.63	−0.69			30 12 45.	
	Gootydroog,	77 48 5.4	+1.00			77 48 4.5	
12	Koolacondah,	71 59 14.15	−0.89			71 59 10.5	
		180 0 2.18		2.58	−0.40	180 0 0.	
	Koolacondah station from					Guddacul,	149076.1
						Goolydroog,	76719.3

[illegible] 105[illegible]

Numbers.	TRIANGLES.	Observed Angles.	Differences	Substituted Excess	Error.	Angles for Calculation.	Distances in Fathoms.
		° ′ ″		″	″	° ′ ″	
	Arrakerrabetta,	[illegible] 49.50	—1.10			42 0 41.4	
	Gootydroog,					48 24 50.5	
17	Poolycondah,	89 34 30.[illegible]	—2.95			89 34 28.1	
						180 0 0.0	
	Poolycondah from					Arrakerrabetta,	146956.4
						Gootydroog,	130602.7

Arrakerrabetta from Poolycondah=145957,05

	Arrakerrabetta,	61 10 19.75	—0.85			61 10 19.	
	Poolycondah,	38 19 4.7	—0.76			38 19 4.5	
18	Adonidroog,	80 31 37.64	—1.18			80 34 36.5	
		180 0 9.09		2.[illegible]9	+0.70	180 0 0	
	Adonidroog from					Arrakerrabetta,	91779.9
						Poolycondah,	129806.9

Poolycondah from Adonidroog=129805.9

	Poolycondah,	75 37 [illegible]9.5	—1.47			[illegible] 37 16.3	
	Adonidroog,	52 37 45.39	—1.36			52 37 45.3	
19	Kerra Bellagul,	53 11 59.94	—1.16			53 44 58.4	
		180 0 6.33		3.78	+2.55	180 0 0.0	
	Kerra Bellagul from					Poolycondah,	127920.1
						Adonidroog,	154329.5

Adonidroog from Kerra Bellagul=154420.5

	Adonidroog,	68 45 55.67	—1.85			68 4[illegible] 53.6	
	Kerra Bellagul,	68 12 [illegible]3.78	—2.06			68 12 50.3	
20	Mallabad hill,	63 1 [illegible]	—1.7[illegible]			63 1 15.8	
		180 0 [illegible]		5.63	+3.33	180 0 0	
	Mallabad from					Adonidroog,	[illegible]306.1
						Kerra Bellagul,	186[illegible]1.7

STATEMENT OF AN ARC

Kerree Bellagul from Mallabad = 168[illegible]1.7 feet

Number	TRIANGLES.	Observed Angles.	Differences	Spherical Excess	Error.	Angles for Calculation.	Distances in Feet.
	Kerree Bellagul,	41 35 34.43	—1.11			41 35 33.2	
	Mallabad,	62 16 20.47	—1.27			62 16 19.1	
21	Darroor hill,	76 8 9.3	—1.56			76 8 7.7	
		180 0 4.17		3.03	+0.27	180 0 0.	
	Darroor hill from	Kerree Bellagul,					150701.3
		Mallabad,					113918.2

Mallabad from Darroor hill = 113018.2

Number	TRIANGLES.	Observed Angles.	Differences	Spherical Excess	Error.	Angles for Calculation.	Distances in Feet.
	Mallabad,	67 52 25.	—1.10			67 52 23.	
	Darroor hill,	59 32 6.84	—1.00			59 31 58.8	
22	Kotaplily hill,	52 35 40.06	—0.94			52 35 38.2	
		180 0 5.70		3.04	+2.66	180 0 0.	
	Kotaplily hill from	Mallabad,					122652.1
		Darroor hill,					131799.1

Darroor hill from Kotaplily hill = 131799.1

Number	TRIANGLES.	Observed Angles.	Differences	Spherical Excess	Error.	Angles for Calculation.	Distances in Feet.
	Darroor hill,	46 39 10.88	—1.07			46 39 9.8	
	Kotaplily hill,	84 45 40.7	—1.84			84 45 38.8	
23	Impahgutt,	48 32 13.04	—1.08			48 32 12.	
		180 0 4.02		3.99	+0.03	180 0 0.	
	Impahgutt from	Darroor hill,					175156.7
		Kotaplily hill,					127899.0

DESCRIPTION OF THE GREAT STATIONS.

Bajy.—North end, in the flat cotton ground about three miles west of *Gooty*, and near the village of *Nunthabad*.—It is situated on a rising ground, marked by a circular platform of brick and chunam with a stone and circle, one center of which ascertains the extremity of the base.

South end.—Lies nearly a mile north of the village of *Ferandpally*, and is similarly marked with the former one.—Under the masonry of both these platforms, the extremities of the base are also defined by stones with circles fixed when the foundation was laid, and corresponding with those above.

Gootydroog.—On the highest point of that *Droog*; while observing the flag staff was removed. It was afterwards replaced and marks the station.

Rogemaricondah.—A conspicuous hill on the range lying about four miles west from *Gooty*.—The road to the summit is on the south side of the hill, leading from *Nagjinkrum*, a considerable village about two miles south from the hill.—The station is on the summit marked by a platform and a stone with a circle.

Pauny hill.—A long hill, running nearly east and west, and about two miles north of the village of *Pauny* and [illegible]. The station is on a platform, and [illegible] marked [illegible].

Bolecondah.—This is a long white rocky hill about ten miles N. W. from *Gooty*, and north of the village of *Pond[illegible]*, about one and half miles distant. The great road from *Gooty* to *Bellary* running between

the hill and the village.—The station is marked on a rock by a circle.

Guddoor Pagoda.—On the platform of the pagoda marked as usual. The village and hill are well known, being about half the distance between *Gooty* and *Bellary*.

Koolzeondah.—This hill is about 14 miles north from *Gooty* in the *Chinampully* talook, and two miles from the village of the same.—On the summit of a large detached stone marked as usual, is the station.

Arvakorrabetta.—The station is on a range of hills North East of *Gooteem*, and about three miles west from *Auloor*.—*Arvakorra*, a considerable village, from which the station derives its name is not far south. The station is marked by a stone and circle in the center of a platform.

Poolyondah.—In the *Dawuncondah* talook about four miles south from *Dawuncondah*. The hill takes its name from a small village situated on a height about two miles N. W. of the hill.—The station is marked by a high platform, stone, &c.

Adonidroog.—This place is too well known to need any description farther than that the station is on a stone building on the highest part of the *Droog*, marked [illegible]

Kerrae Bellagud.—A low hill about half a mile east from the village of *Kerrae Bellagud* and about seven miles south from the *Toogabudra*. The station is marked on [illegible] by a circle.

Mallieboh.—In the territories of His Highness the *Nizam*, and the highest of a range of hills running south from *Bachom*, and about five

[illegible] HILL M[illegible]

[illegible] miles distant [illegible] from [illegible] to [illegible] [illegible] two miles east [illegible] hill, [illegible] the village of *Mallia* [illegible] mile north.—[illegible] station is marked on the rock by a circle.

Dar[illegible] hill.—This hill is also *Malliabad* is in the *Gooty*.—[illegible] is a peaked hill about two and a half miles west from the village of the same, and about nine miles west from *Guddawaal*. The town *Kistna*[illegible] is eighteen miles north from the hill.—The station is marked on a rock by a circle.

Koopilly hill.—About five miles north of the *Kistna*, and about ten miles S. W. from *Muktal*, having *Goode Bellour*, a well known place between it and the *Kistna*; the village of *Koopilly* is on the north side of the hill about half a mile distant.—The station is on a rock marked by a circle.

[illegible]pulgeel.—The highest of a conspicuous range of hills lying between *[illegible]* and *Kollandah Droog*, and about four miles south of *[illegible] Krishnallah poor*, a small village from which the road to the station leads, is about two miles north of the hill.—The station is on a rock marked by a circle.

[illegible] OF AN ARC

Triangles depending on the base and [illegible] which not correspond

[illegible] to the distance between [illegible]

5. MEASUREMENT OF THE BASE LINE NEAR DAU-MERGIDDA.

Experiments made for comparing the chains after the measurement.

1815.	Excess of the old chain.	REMARKS.
	Divisions.	
February 15th, A. M.	45.8	
	45.	
	46.	
	45.	
	45.	
	45.	
P. M.	45.	Mean Temperature during [illegible]
	46.0	
	45.8	
	45.5	
A. M.	45.5	
	46.	
	45.[illegible]	
	45.	
	45.2	
	[illegible]	
	[illegible]	
Mean	45.63	

Note.—45.63 divisions of the old chain equal [illegible].8825 feet, and, by subtracting the other comparison where [illegible] the old chain exceeded the new one [illegible] feet, the mean excess equal [illegible].0078 feet in the year

TABLE CONTAINING THE PARTICULARS OF THE MEASUREMENT.

No. of the Hypothenuse.	Length of each in Feet.	Angles of Elevation and Depression.			Deductions from each Hypothenuse.	Perpendicular.		Commencement from the last.		Mean Temperature.	REMARKS.
						Ascents.	Descents.	Above.	Below.		
		°	′	″	Feet.	Feet.	Feet.	Inches.	Inches.	°	
1	300	0	51	48	.03405	4.42		27.0		74.	Commenced on the 23d January, 1815.
2	300	0	8	33	.00093		0.75		4.	85.5	
3	300	0	38	12	.01651		3.33		2.5	95.3	
4	700	0	26	18	.02051		5.36		12.5	88.	
5	600	0	37	57	.03654		6.62			74.	
6	500	0	42	0	.03750		6.11		12.7	92.	
7	500	0	50	0	.05290		7.27		11.2	91.3	
8	500	1	2	51	.08353		9.14		8.6	66.7	
9	400	0	22	24	.01776		3.77	12.5		75.7	
10	400	0	46	48	.03708		5.45		21.	77.3	
11	600	0	36	53	.03450		6.44		14.5	94.5	
12	600	0	16	57	.00726		2.05	11.5		69.3	
13	600	Level						18		91.8	
14	200	1	24	31	.06020	4.94		4		79.9	
15	600	0	34	45	.03065	6.06			2.	70.9	
16	600	0	11	0	.00306	1.92			7.8	95.3	
17	800	0	17	57	.01083		4.18		4.4	88.	
18	700	0	36	54	.04033		7.51		2.	72.6	
19	800	0	51	15	.08888		11.93		15.8	93.1	
20	400	0	26	6	.01152		3.04			102.8	
21	300	0	16	42	.00354		1.46		0.	61.6	
22	700	0	51	57	.01428	4.47		27.4		71.4	
23	600	0	6	14	.00095		1.09		8.	96.0	
24	400	0	5	18	.00068		0.73		13.5	102.7	
25	300	0	7	12	.00066	0.63		11.8		65.	
26	800	0	39	3	.11804		13.74		0.2	87.2	
27	400	2	52	51	.30552		20.1	4.2		101.2	
28	300	1	24	33	.00675		7.38	12.5		84.1	
29	600	0	9	39	.00234		1.68	6.3		77.5	
30	700	0	45	31	.06139	0.27		5.6		92.4	
31	500	0	5	24	.00065		0.79		9.7	101.	
32	300	0	45	03	.02673		4.0		8.5	66.6	
33	400	0	35	25	.02122		4.12		12.6	87.7	
34	200	0	0	18			0.02	7.3		100.9	

6. ANGLES.

At the West end of the Base.

BETWEEN	AND	°	′	″	″
Malliga hill	Daumergidda	82	38	48.5	46.57
				46	
				55.5	
				44	
				44	
				44	
				44	
East end of the Base	Malliga	75	38	29	82.18
				38	
				37	
				86	
				26	
				36.5	
				82.5	
				82	

At the East end of the Base.

		°	′	″	″
West end of the Base	Malliga hill	75	39	23	24.6
				22	
				29	
				29	
				23.5	
				22	
				23.5	
				22.5	
				26.5	
				26	

At Malliga hill.

BETWEEN	AND	°	′	″		
West end of the Base	East end of the Base	28	46	69		
				68.5		
				65		
				59.5		
				69.5		
				70	65.1	
				64.5		
				61.5		
				60		
				70		
				58		
	Daumergidda	26	15	27		
				29		
				27		
				27		
				31.5		
				33.5	29.44	
				27.5		
				30.5		
				28.5		
				32.5		
				29.5		
Daumergidda	Doodallah	59	49	32.5		
				33		
				26.5		
				30		
				33		
				23		
				28		
				35		
				34	29.67	
				29		
				27.5		
				32.5		
				22		
				83		
				81		
Doodallah	Sheolapilly	74	20	55.5		
				59.5		
				55.5		
				58		
				59	57.55	
				58.5		
				57		
				58.5		
				56.5		

At Daumergidda

BETWEEN	AND	°	′	″	
West end of the Base	Malliga hill	21	5	48	
				41	
				41	
				42	
				47·5	34
				41	
				46	
				40·5	
				40·5	
Malliga hill	Doodallah	78	20	30·5	
				24	
				23·5	
				22	
				21	
				31	25·95
				28·5	
				19·5	
				26·5	
				26·5	
Doodallah	Sheclapilly	59	20	47	
				47	
				43	
				46	
				48	
				45	44·37
				41	
				43	
				48·5	
				45	
				45·5	

At Doodallah.

Daumergidda	Sheclapilly	70	25	55·5	
				52	
				55·5	
				54·5	
				53	
				55	
				41	
				44·5	
				54	

At Doodallah (continued.)

BETWEEN	AND	°	′	″	
Malliga hill	Sheelapilly hill	28	35	45	
				45·5	
				44·5	
				43	
				42·5	43·56
				89·5	
				43·5	
				45	
Sheelapilly	Goraegutt	42	10	81	
				81	
				88	
				86	
				37	
				87	
				82	
				84	81·58
				85	
				81	
				26	
				28·5	
				29	
				29·5	
				26	
Goraegutt	Taud Munnoor	41	8	45·5	
				50·5	
				51	
				46	
				51	49·1
				49·5	
				48	
				51·5	
	Topecondah	31	23	26	
				21·5	24·1
				25	
				24	
Sheelapilly hill	Goraegutt	42	40	31·58	
Goraegutt	Taud Munnoor	41	8	49·1	
Sheelapilly hill	Taud Munnoor	83	48	20·68	
Daumergidda	Sheelapilly	70	25	51·6	
Sheelapilly	Malliga hill	28	35	43·56	
Malliga hill	Daumergidda	41	50	8·11	

Sheeballa

BETWEEN	AND				
[illegible]	Doodallah	77	8	22.5	
				26.5	
				26.5	
				25	
				26	25.72
				22.5	
				26.5	
				27	
				29	
Barmergidda	Doodallah	50	18	27	
				24.5	
				28.5	
				27	
				27	
				26	26.68
				24	
				27.5	
				30	
				23	
				28.5	
Doodallah	Coraegunt	78	49	7	
				9.5	
				8.5	
				5	
				2.5	
				9	
				9.5	6.42
				6.5	
				5	
				9.5	
				8.5	
				1.5	
Coraegunt	Kotsurpilly	29	59	25	
				27.5	
				29	
				30.5	28.86
				31	
				27	

At Geraegutt (continued.)

BETWEEN	AND	°	′	″	
Sheelapilly	Kotamarpilly	111	15	26.5	
				22	
				10.5	
				25.5	
				15	22.4
				19	
				19	
				27.5	
				27	
				23	
Tau Munnoor	Topecondah	83	33	21.5	
				22	
				21	
				27.5	
				24.5	
				21	
				31	23.25
				21.5	
				27.5	
				21	
				22	
				23	
				26.5	
Topecondah	Kotamarpilly	69	8	57	
				55.5	
				57	
				56.5	
				58	
				58	
				56.5	57.09
				58	
				59	
				55	
				55	
				56	
				56	
Tand Munnoor	Doodallah	30	31	55	
				57.5	
				57.5	
				57	
				58	
				59.5	57.33
				55	
				59	
				59.5	
				61	
				57.5	
				57.5	

At Goracgutt (continued.)

BETWEEN	AND	°	′	″
Taud Munnoor	Topecondah	83	33	23.85
Taud Munnoor	Doodallah	82	31	37.88
Doodallah	Topecondah	116	5	21.08

At Kotamarpilly.

Sheelapilly	Goracgutt	88	45	16.5	
				8	
				14	
				18.5	12.M
				10.5	
				14.5	
				12	
Goracgutt	Peecha Raggeddy	65	26	45	
				54.5	
				52	
				52.5	
				51.5	50.05
				54	
				42	
				41.5	
				56	
				51.5	
Sheelapilly	Peecha Rageddy	16	41	87.5	
				29.5	
				33.5	85
				86	
				85.5	
				38	
Peecha Raggeddy	Annantagherry	114	8	26	
				24.5	
				21.5	
				86.5	
				25.5	
				81.5	80.71
				29	
				28.5	
				39.5	
				34	
				85	
				87	

BETWEEN	AND			
Annaghilly	Carnaraphilly	50 34	[illegible]	
			[illegible]	
			[illegible]	
			53·5	
			52·5	
			52	
			66·5	
			49	
			51	
			51·5	34·92
			54	
			[illegible]	
			[illegible]	
			57	
			[illegible]	
			58	
			[illegible]	
			67	
			53	
Tonaraphilly	Goreeguit	34 [illegible]	57	
			60·5	
			[illegible]	
			[illegible]	
			[illegible]	
			[illegible]	
			[illegible]	
			5	
			[illegible]	69·77
			5[illegible]·5	
			[illegible]	
			69·5	
			[illegible]	
			[illegible]·5	
			52	
			56·5	
			[illegible]	
Tonaraphilly	Lowallen	[illegible]	13	
			[illegible]	
			16·5	
			19·5	
			15·5	17·33
			19·5	
			19·5	
			15·5	
			[illegible]	

At Tofecondan (continued)

STATIONS							
Gerragoo	...	...	Tank Equator	...	[illegible]	[illegible]	[illegible]
						23.5	
						[illegible]5	
						31.5	
						26	
						29	26.75
						29.5	
						27.5	
						23	
						22.5	
						23	

At Annantaghery.

STATIONS							
Kaigal hill	...	...	Kotakoddangal	...	70	[illegible]	[illegible]
						[illegible]	
						41.6	
						[illegible]	
						5 6	
						[illegible]	
						46 5	50.50
						50.5	
						54.5	
						54	
						57	
						53.5	
						[illegible]	
Kotakoddangal	...	...	Thuttapilly hill	...	69	27	38
							35.5
							36.5
							[illegible]
							38.65
							[illegible]
							38.2
Thuttapilly	...	...	Kotamerdoo	...	46	12	[illegible]
							35.5
							28
							[illegible]
							55.0
							60
							60.5
							60.5
Kotakoddangal	...	...	Thuttapilly	...	69	27	38.67
Thuttapilly	...	...	Kotaperadilly	...	46	12	59.0
Kotamerdoo	...	...	Kotakoddangal	...	[illegible]	10	22.67

[illegible] Pergy[illegible]

[illegible]				
Pothuangudi [illegible]	Kotakoddangul	79 76	56	
			7·5	
			7·8	[illegible]·4[illegible]
			9·5	
			11·5	
			5	
			[illegible]	
			17	
			[illegible]	
Kotakoddangul		Annanagherry	80 [illegible]	10	
			[illegible]	
			[illegible]	
			[illegible]	[illegible]6 [illegible]
			[illegible]	
			[illegible]	
			[illegible]	
			10·5	

At Kotakoddangul.

Topaiy[illegible]	Pothuangudi	[illegible]	[illegible]	
			[illegible]	
			61	
			[illegible]	
			6[illegible]	[illegible]30·[illegible]
			50·5	
			58	
			6[illegible]	
			54	
			56	
			57[illegible]	55[illegible]
			56	
			57·5	

Mean = 56·[illegible]

...Kerakoddai-gui (continued)

Pochaveguts	Pur...	26.63	
		27·93	
		Mean = 27·88	
	...ateghery	55 8	
...tanegherry	Thalapilly	83 ...	
Thulapilly	...atapilly	96	

[illegible]

At Kaunkoodaargul (continued)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Inpanguit	Kaunkoodaargul	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
Annanthaghery	Thulapilly	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Thuttapilly	Kotamarpilly	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kotamarpilly	Annanthaghery	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

At Pouramaguit.

Kotakoddangul	Purgy hill	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
Inpahguit	Kotakoddangul	[illegible]	[illegible]	73	56	57
				[illegible]	[illegible]	[illegible]
				68	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				63	[illegible]	[illegible]

At Kaunkoodaar.

Kundakoor	Inpahguit	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
				57.6	[illegible]	[illegible]
				56.4	[illegible]	55.2
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]
Inpahguit	Kotakoddangul	[illegible]	[illegible]	[illegible]	52	55.5
				[illegible]	[illegible]	[illegible]
				50.5	[illegible]	[illegible]
				50.8	[illegible]	[illegible]
				46.1	[illegible]	[illegible]
				45.5	[illegible]	47
				[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]

[illegible] SU[illegible] AN ARC

[illegible] Kandakoor hill

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Kotapully	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
					5[illegible].8	
					56	
					6[illegible].8	
					52.7	55.18
					56	
					61	
					6[illegible]	
[illegible]	[illegible]	[illegible]	Kaunkoortee hill	[illegible]	59	37.1
					[illegible]1	
					37	
					30.3	35.36
					31.5	
					39	
					35	
					8 6	

[illegible] Inpahgulli.

Kotapully	[illegible]	[illegible]	Kandakoo. hill	[illegible]	57 24	21.9
						21.5
						14.6
						12.3
						18.8
						20
						14.2
						15.8
						14.7
Kandakoor hill	[illegible]	[illegible]	Kotakoddangul	[illegible]	7[illegible] 6	8.7
					[illegible]	8.4
					[illegible]	6
						8.5
						9
						10
Kandakoor hill	[illegible]	[illegible]	Kaunkoortee hill	[illegible]	8[illegible] 8	28.7
						32
						34.4
						30.8
						33.3
						[illegible]
						28.7
						31.5
Kotakoddangul	[illegible]	[illegible]	Kandakoor	[illegible]	78 6	[illegible]
Kandakoor	[illegible]	[illegible]	Kaunkoortee	[illegible]	8[illegible] 3	[illegible].7
Kaunkoortee	[illegible]	[illegible]	Kotakoddangul	[illegible]	4[illegible] 7	30.07

ON THE MERIDIAN.

Latitude.

[illegible]	[illegible]	[illegible]	[illegible]
Inpahgur	[illegible]	[illegible]	[illegible]

PRINCIPAL TRIANGLES.

W. end of the base from the E. end of the base = 30900.[illegible] feet

No.	Stations	Observed Angles.	Differences.	Spherical Excess.	Errors.	Angles for Calculation.	Distances in F. ft.
	W. end of the base,	28 58 5[illegible].15	−0.10			75 [illegible] 31.5	
	E. end of the base,	75 59 34.[illegible]	−0.10			75 59 93.7	
	Malliga hill,	96 47 [illegible]	−0.15			93 [illegible] 5	
		180 [illegible]		0.[illegible]	−1.00	180 0	
	Malliga hill from	W. end of the base,					5[illegible]52.9
		E. end of the base,					61[illegible]5.6

W. end of the base from Malliga hill = [illegible] feet

	W. end of the base,	5[illegible] 36 [illegible] 57	0.18			68 29 [illegible] 3	
	Malliga hill,	26 [illegible]	0.11			56 16 [illegible]	
26	Dodderidge,	71 [illegible]	−0.10			71 [illegible] 100	
		79 [illegible]		[illegible]	−1.00	180 0 0	
	Malliga hill from	W. end of the base,					5[illegible]7.7
		E. [illegible]					8[illegible]7.5

MEASUREMENT OF AN ARC

Station	Transits	Distances	Deflection Angles	Curves	Corrections	Corrected Distances
	Demanded from [illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
	Deviation from Straight line					[illegible]
	Distance from Prodable [illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
	Deviation from Prodable					[illegible]
	Distance from Prodable [illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
	Deviation from Prodable					[illegible]
	Distance from Prodable [illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
	Deviation from Prodable					[illegible]

Stations	Observed Angles	Corrections	Reduced Angles	Corrections	Adopted Angles	Sides
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
					180 0 0	
Sides computed from [illegible]						68827.8 105310.1
Sides computed from Tondmarcum [illegible]						
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
					180 0 0	
Sides computed from [illegible]						71300.5 893[illegible]
Sheerlaplity from Gorsegull 71846.[illegible] feet.						
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
	180 0 [illegible]		[illegible]		180 0 0	
Sides computed from Sheelaplity, Gorsegull,						10[illegible] 870[illegible]
Sides computed from Gorsegull 10[illegible] feet.						
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]			[illegible]	
	180 0 [illegible]		[illegible]		180 0 [illegible]	
Sides computed from [illegible], Gorsegull,						108386.2 [illegible]

MEASUREMENT OF AN AR[illegible]

Number	Stations Observed	Observed Angles	Differences	Number of Angles	Error	Angles for Calculation	Distances in Feet
		° ′ ″				° ′ ″	
	Dondal,	41 18 43.8	−0.10			41 18 [illegible]	
	Gorangutt,	32 31 57.93	−0.18			32 31 57.[illegible]	
34	Tandmanoor,	106 [illegible] 58.93	−0.53			106 [illegible] 58.[illegible]	
		180 0 [illegible] 8.60		1.80	−1.09	180 0 0.	
	Tandmanoor from	Dondal,					53669.
		Gorangutt,					69353.5

Gorangutt from Tandmanoor = 69353.5

Number	Stations Observed	Observed Angles	Differences	Number of Angles	Error	Angles for Calculation	Distances in Feet
	Gorangutt,	35 [illegible] 29.85	−0.71			35 [illegible] 29.6	
	Tandmanoor,	[illegible] 4 11.9	−0.46			59 [illegible] 11.4	
35	Tapercondah,	37 22 26.[illegible]	−0.4[illegible]			37 [illegible] 26.0	
		180 0 1.35		1.80	−0.29	180 0 0.	
	Tapercondah from	Gorangutt,					98[illegible]3.0
		Tandmanoor,					[illegible]0.4

Gorangutt from Tapercondah = 98[illegible]3.0 feet.

Number	Stations Observed	Observed Angles	Differences	Number of Angles	Error	Angles for Calculation	Distances in Feet
	Gorangutt,	69 8 57.09	−0.32			69 8 56.0	
	Tapercondah,	34 [illegible] 59.77	−0.34			34 [illegible] 59	
36	Kotamarpilly,	76 [illegible] 4.87	−0.08			76 [illegible] 4.4	
		180 0 [illegible]		1.94	+0.79	180 0 0	
	Kotamarpilly from	Gorangutt,					57009.9
		Tapercondah,					94220.6

Gorangutt from Kotamarpilly = 57009.9 feet.

Number	Stations Observed	Observed Angles	Differences	Number of Angles	Error	Angles for Calculation	Distances in Feet
	Gorangutt,	111 16 [illegible] 4	−0.71			111 16 [illegible]0.5	
	Kotamarpilly,	38 45 15.1	−0.98			38 45 15.[illegible]	
37	Sheelapilly,	[illegible] 22.86	−0.11			30 30 [illegible]7.0	
		180 [illegible] 8.56		0.90	+2.46	180 0 0	
	Sheelapilly from	Gorangutt,					71[illegible]3
		Kotamarpilly,					106[illegible]7.3

Kotamarpilly from Topecondah = 94290 feet

No.	Triangles	Observed Angles	Difference	Spherical Excess	Error	Angles Calculated	Sides in Feet
	Kotamarpilly	76° 4′ 33.83″	−0.1			76° 4′ 32.2″	
	Topecondah	43 34 52.9	−0.30			43 34 52.6	
38	Annantaghurry					60 20 34.3	
						180 0 0	
	Annantaghurry from	Kotamarpilly					74745.4
		Topecondah					105237.6

Kotamarpilly from Annantaghurry = 74745.4 feet.

No.	Triangles	Observed Angles	Difference	Spherical Excess	Error	Angles Calculated	Sides in Feet
	Kotamarpilly	37° 3′ 40.27″	−0.03			37° 3′ 38.7″	
	Annantaghurry	115 40 32.67	−1.41			115 40 30.9	
39	Kotakoddangul	27 15 53.[illegible]	−0.23			27 15 53.4	
		180 0 2.3		1.67	+1.30	180 0 0	
	Kotakoddangul from	Kotamarpilly					147052.3
		Annantaghurry					94329.9

Kotamarpilly from Kotakoddangul = 147052.3 feet.

No.	Triangles	Observed Angles	Difference	Spherical Excess	Error	Angles Calculated	Sides in Feet
	Kotamarpilly	131° 41′ 30.81″	−1.13			131° 41′ 29.6″	
	Kotakoddangul	[illegible]				20 1 41.6	
40	Sheelapilly	[illegible]				28 16 51.8	
						180 0 [illegible]	
	Sheelapilly from	Kotamarpilly					108296.8
		Kotakoddangul					231787.6

In order to obtain the distance from *Sheelapilly* to *Kotakoddangul*, for the purpose of reducing the correlative arc, being more conveniently situated with respect to the meridian of *Dodagantah*, the internal chord angle at *Kotamarpilly* with the included sides *Sheelapilly* from *Kotamarpilly*, and *Kotamarpilly* from *Kotakoddangul* have been used. Hence (as in the above triangle) the side *Sheelapilly* to *Kotakoddangul* = 231787.6 feet, and the angles at *Sheelapilly* and *Kotakoddangul* corrected as observed angles will be 28° 16′ 30.8″, and 20° 1′ 41.1″.

Innamugerre from Kotakoddangal = [illegible]

Station	Observed Angles	Reductions	Supplemental	Error	Angles for Calculation	Distances in Feet
	° ′ ″				° ′ ″	
Innamugerre,	[illegible]	−0.32			[illegible]	
Kotakoddangal,	22 39 56.6	−0.23			22 39 56.6	
Purgy hill,	80 10 13.0	−0.26			80 10 13.6	
	180 0 4.0		0.91	+0.18	180 0 0	

Purgy hill from { Innamugerre, ... 40057.6
Kotakoddangal, ... 50699.2 }

Kotakoddangal from Purgy hill = 50699.2 feet

Station	Observed Angles	Reductions	Supplemental	Error	Angles for Calculation	Distances in Feet
Kotakoddangal,	47 58 27.38	−0.59			47 58 26.1	
Purgy hill,	70 55 11.41	−0.88			70 55 9.9	
12 Pochamagutt,	62 6 25.2	−0.60			62 6 25.1	
	180 0 4.0		2.07	+4.13	180 0 0.	

Pochamagutt from { Kotakoddangal, ... 120809
Purgy hill, ... 91312.2 }

Kotakoddangal from Pochamagutt = 120809.2

Station	Observed Angles	Reductions	Supplemental	Error	Angles for Calculation	Distances in Feet
Kotakoddangal,	57 0 [illegible]	−1.16			57 0 56.	
Pochamagutt,	73 57 5.0	−1.44			73 57 4	
18 Inpahgutt,	[illegible]				49 2 [illegible]	
					180 0 0.	

Inpahgutt from { Kotakoddangal, ... 103843.2
Pochamagutt, ... 138[illegible]7.0 }

Kotakoddangal from Inpahgutt = 153[illegible]

Station	Observed Angles	Reductions	Supplemental	Error	Angles for Calculation	Distances in Feet
Kotakoddangal,	30 9 59.4	−0.47			[illegible]	
Inpahgutt,	41 9 30.07	−0.33			41 [illegible]	
44 Kaankoorree,	[illegible]	[illegible]			[illegible]	
	180 [illegible]		2.56	+0.25	180 0 0	

Kaankoorree from { Kotakoddangal, ... 10158[illegible]
Inpahgutt, ... 98890.3 }

[illegible]kooree from Inpahgutt = 98390 [illegible] feet.

TRIANGLE.	Observed Angles.	Differences			Angles for Circulation.	Distances in Plain
	° ′ ″				° ′ ″	
Kanbkoorees, [illegible]	88 44 66.7	−0.8			88 21 34.7	
Inpahgutt, [illegible]	32 3 30.7	−[illegible]			32 3 30.1	
46 Kandakoor hill, [illegible]	59 34 35.96	−0.37			59 [illegible] 35.1	
	180 0 2.96		−1.41	+0.56	180 0 0	
Kandakoor from { Kanbkoorees, [illegible] / Inpahgutt, [illegible]						80563 / 114061.9

Inpahgutt from Kandakoor = 114061.[illegible] feet.

TRIANGLE.	Observed Angles.	Differences			Angles for Circulation.	Distances in Plain
Inpahgutt, [illegible]	57 21 17.09	−0.9			57 [illegible] 18	
Kandakoor, [illegible]	67 15 55.18	−2.05			67 15 54	
60 Kotapilly, [illegible]	55 19 50.91	−0.93			55 19 50.	
	180 0 3.18		9.98	+0.98	180 0 0.	
Kotapilly from { Inpahgutt [illegible] / Kandakoor, [illegible]						157909.8 / 116832.0

Inpahgutt from Kotapilly = 157909.8 feet.

TRIANGLE.	Observed Angles.	Differences			Angles for Circulation.	Distances in Plain
Inpahgutt [illegible]	48 39 12.04	−1.06			48 39 12	
Kotapilly hill, [illegible]	64 18 40.7	−1.84			64 18 38.8	
47 Darroor Hill, [illegible]	46 59 10.98	−1.05			46 59 10.2	
	180 0 4.02		4.02	+0.98	180 0 0	
Darroor Hill from { Inpahgutt [illegible] / Kotapilly, [illegible]						178161.0 / 131809.7

8. DESCRIPTION OF THE GREAT STATIONS.

Base Line.—The west end is on a high ground near *Beder* about ten miles north, and three and a half miles north west by west from *Kanrame*, nearly. The station is on the highest part of the ground marked [illegible] platform built of stone and chunam, level with the surface of the ground, having a large stone in the center marked with a circle. There are several villages around this station, as *Shicarkanah* to the south west about two miles; *Oudotpoor* one and a quarter miles west, and *Yashigy* about one and a half miles west northwest.

The east end is at the north east angle of a [illegible] on the northern declivity of the high ground lying between the [illegible] *gidde* and *Naugilgidda*. [illegible] situated on [illegible] from *Moorung* [illegible] by way of *Jaypore*. The station [illegible] by a platform of stone and of [illegible] three feet above the ground, in the center of which is a stone with a circle.

Dauma gidde station. The grand station of observation in latitude 18° 3′ 23·6″ is on a conspicuous high ground about one mile south east from the village of *Daumagadda*, and about eight miles [illegible] from *Viraiyadda*. The station is on the summit of the high [illegible] ground, a few feet west of the road leading from *Chillengy* to *Chelengy*, and is marked by a stone [illegible] level with the ground [illegible] the foundation marked with a circle and corresponding with the [illegible] on the stone above.

Malliga hill. The most conspicuous hill of a range seemingly connected with the *Bolen* heights, about six miles east [illegible] about one mile south east of *Malliga*, a small village [illegible] which the hill derives its name. The station is marked on the [illegible] stone with a circle laid over it, surrounded with a pile of [illegible] supporting a small tree.

Doddulur station is on an extensive range of [illegible] station east and west, and is about two and [illegible] west, and about one mile north of *Doddulur*. The station is marked by a stone and circle on a platform.

Note. The great tree on the high ground about three-quarters of a mile from the station, being in the way of the flag at *Malliga*, a branch of the tree was cleared off in order to observe the flag on the left side of it,

Sheelapilly station is on a conspicuous nob or mound of earth rising about 60 feet above the plain on which it stands, its base not sensibly differing from a circle whose diameter may be 200 feet nearly; this station is about 4 miles west of *Sungam* and 2½ miles south of *Moongy*, both places being on the road from *Beder* to *Hyderabad*. A circle inscribed on a stone in the center of a circular platform of clay about 10 feet high, raised on the nob with a marked stone at the foundation, defines the station.

Tandmunnoor station is on a high ground about 7 miles west from *Jogypett*, situated between *Royepood* and *Tandmunnoor*. The station is defined by a circle inserted on a stone.

Goraigutt hill. This is a low brown hill taking its name from a very small village at the south east foot, lying about 1½ mile west of *Goplaveram*, a low fortified hill, and about 4 miles south west of *Moompally*, a village of some note on the great road from *Hydrabad* to *Beder*. The station is marked by a stone and circle on the summit about 60 feet north east of a stone pillar.

Topeconda. This is about 15 miles east of *Mominpett*, and about 3 miles west of *Chebepett*, a large village in the road from *Mominpett* to *Hydrabad*, and the village which gives the name to the station, is at the east foot of a low hill and pagoda lying about one mile east of the station. A stone with a circle on the summit defines the station.

Kotamurpilly. This station is on the south extremity of a low gravel ridge about 2 miles east south east of *Pedda Murpilly*, about ¾ of a mile from *Kotamurpilly*, and about 10 miles west of *Mominpett*, a place of considerable note. The station is marked on the gravel rock about 200 feet south east of a remarkable *Banian* tree.

Annentaghery hill. This is a flat hill covered with thick jungle, situated

about 11 miles north of *Purgy*, and about 8 miles east of *Doraly*. The station is about one mile south west of the Pagoda, on a platform, marked by a stone with a circle.

Kotaiedderngul station, on a high ground about [illegible] miles south east of the large village of *Kotaiedderngul*, and about half a mile north west of a remarkable tree on the same ground. The station is marked by a stone and circle in the middle of a platform.

Purgy hill. The southernmost of a chain of hills covered with much jungle, situated about 9 miles north east of *Purgy*.—Near the west foot of the hill is a small village, *Mulla Boyengoodem*. The jungle on the hill has been cleared and a platform raised, in the middle of which is a stone with a circle marking the station.

Pochamaguit. This is a low hill though the highest in that neighbourhood. It is surrounded to a great extent with much jungle, and derives its name from a place of worship in the vicinity, and is about one mile east from *Coofmafundrum*. The jungle has been cleared from the top, and a stone with a circle sunk on the summit denotes the station.

Kaunkoortee hill. A flat hill on the Table land, about [illegible] miles north east of *Goondamettakui*, a very extensive plain, and about [illegible] mile north of *Kaunkoortee*.—The station is marked by a circle on a stone fixed on the top of the hill, and near the west brink.—*Annageondy*, a well known hill, having two very remarkable trees on the summit, is about one mile west of the station.

Kunikoor. A low hill below the Table land about [illegible] miles west of *Naranapettah*, about six miles south west of *Goondamettakui*, and [illegible] mile south east of *Chintelolly*: the village from which the hill derives its name, is at the south foot. The station is marked by a stone and circle sunk on the summit of the hill.

REDUCTION OF THE SIDES OF THE MERIDIONAL TRIANGLES TO THE MERIDIAN OF DODAGOONTAH FOR DETERMINING THE LENGTH OF THE TERRESTRIAL ARC.

The length of the Arc comprehended by the parallels of Dodagoontah station, and the stations at Namthabad and Daumergidda.

Stations of	Names of Places	Bearings referred to the Meridian of Dodagoontah Station	Distance	Distances on the Perpendicular	Distances on the Meridian	Distance from Dodagoontah on the Perpendicular	Distance from Dodagoontah on the Meridian
			Yards.	Yards.	Yards.	Yards.	Yards.
Yerracondah	Oora [illegible]	[illegible] 6 N.W.	126786	[illegible] W.	198891.0 N.	9245.9 W.	458428.7 N.
Oorr[illegible]ah	Dava[illegible]	5 39 52 [illegible] N. E.	100806.1	12560.4 E.	[illegible] N.	9205.6 E.	608289.8 N.
Do[illegible]ondah	[illegible]	3 16 40.6 N. E.	158946.2	771.0 E.	158934 N.	76.0 E.	767031.1 N.
[illegible]	Namthab[illegible]	70 48 50.0 S. W.	16479.9	15848.9 W.	54[illegible] S.	[illegible] W.	761290.6 N.
	Koolaco[illegible]ah	10 59 24.9 N.W.	137320.9	24835.2 W.	753[illegible] N.	3[illegible] W.	6[illegible]76.6 N.
Kolla[illegible]ah	Poolysondah	[illegible] 6 [illegible] N.W.	64084.1	5978.7 W.	[illegible]3946 N.	9434.7 W.	[illegible] N.
Poolysondah	Kerra Dabagul	[illegible]	197020.1	29870.3 E.	19[illegible] N.	20[illegible] E.	[illegible]
[illegible]	Dorrcor Hill	2 4 25.0 N.W.	150701.3	8088.4 W.	150484.3 N.	12047.9 E.	[illegible] N.
Dorrcor Hill	Jupahgatty	0 45 15.7 N. W.	17[illegible]	2308.[illegible] W.	1751[illegible] N.	9[illegible]	1346[illegible]
[illegible]pahgatty	Kotal[illegible]dangal	1 49 56.8 N.W.	[illegible]	4503.6 [illegible]	1[illegible] N.	[illegible] E.	1500[illegible] N.
[illegible]dangal	Sheclapilly	2 20 26.7 N. E.	231707.9	9464.9 E.	231[illegible] N.	14613.[illegible] E.	1751371.2 N.
Sheclapilly	Daumergidda Hill	0 [illegible] 33. N. [illegible]	103250.6	46.6 E.	103250.6 N.	[illegible] E.	18[illegible] N.

ON THE MERIDIAN.

The terestrial arc between *Dodagoontah* and *Nanthabad* station as in the foregoing table is 7017966

And the terestrial arc between *Dodagoontah* and *Putchapolliam* (see A. R. Vol 1[illegible]) is ..... 72[illegible]46

The sum will be the terestrial arc between *Putchapolliam* and *Nanthabad* equal 1489131.2

To which add the terestrial arc between *Putchapolliam* and *Punnae* station (see A. R. Vol 1[illegible]) 1029100.5

We have for the terestrial arc between *Punnae* and *Nanthabad station* 2518231.7

The terestrial arc between *Dodagoontah* and *Daumergidda* as in the preceding table is 1835224.8

And the terestrial arc between *Dodagoontah* and *Nanthabad* equal 7617966

The difference will be the terestrial arc between *Nanthabad* and *Daumergidda*. ..... 1073[illegible]

To which add the terestrial arc between *Punnae* and *Nanthabad* as above 2518231.7

The sum will be the terestrial arc between *Daumergidda* and *Punnae* station. 3591659.9

10. Zenith distances of Stars observed at *Punnae*, *Nanthabad* and *Daumergidda* stations, with their corrections for precession, nutation, aberration, and the semi-annual solar equation, back to the beginning of the year 1805.

OBSERVATIONS AT PUNNAE STATION.

LEONIS.

Nearest point on the Limb, 2° 35′ N.

1809. Month.	Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Thermometers. Lower.
		° ′ ″	″	° ′ ″	°	°
April 12	E.	2 35 26.13	+ 19.970	2 36 46.100	84	84
13	W.	2 35 36.63	+ 19.631	2 35 56.861	84	83
14	E.	2 35 25.63	+ 19.590	2 36 45.220	85	84
16	W.	2 35 34.13	+ 19.798	2 36 53.928	85	84
17	E.	2 35 25.88	+ 19.[illegible]	2 36 45.895	84	83
18	W.	2 35 34.5	+ 19.710	2 36 54.210	84	83
19	E.	2 35 23.5	+ 19.561	2 36 43.061	84	84
20	W.	2 35 34.6	+ 19.616	2 36 54.116	84	84
23	E.	2 35 23.25	+ 19.490	2 36 42.730	83	83
24	W.	2 35 35.33	+ 19.227	2 36 54.507	83	83
25	E.	2 35 24.[illegible]	+ 19.376	2 36 43.876	84	84
26	W.	2 35 35.75	+ 19.324	2 36 55.074	85	85
27	E.	2 35 24.25	+ 19.273	2 36 43.523	85	86
28	W.	2 35 36.88	+ 19.221	2 36 56.101	86	87
29	E.	2 35 23.63	+ 19.169	2 36 42.799	84	85
30	W.	2 35 36.63	+ 19.117	2 36 55.747	87	87
May 2	E.	2 35 23.38	+ 19.016	2 36 42.406	84	84
3	W.	2 35 38	+ 18.974	2 36 56.972	82	82
5	E.	2 35 [illegible]	+ 18.865	2 36 [illegible]	84	84
6	W.	2 35 34.75	+ 18.820	2 36 53.570	84	82
7	E.	2 35 25.80	+ 18.766	2 36 44.566	84	84
				Mean	84.14	84.24

REGULUS.

Nearest point on the Limb, 4 46 N.

1809. Month.	Face.	Observed Zenith Distance.	Correction.	Corrected Zenith Distance.	Thermometers. Upper.	Lower.
		° ′ ″	+ ″	° ′ ″	°	°
April 12	W.	4 43 51 87	1 24.419	4 45 16.[illegible]	84	84
13	W.	4 41 2	1 24.369	4 45 20.369	84	83
14	E.	4 43 49 87	1 24.311	4 46 14.18[illegible]	82	83
16	W.	4 43 50 37	1 24.211	4 45 [illegible]	86	[illegible]
17	E.	4 43 49 62	1 24.147	4 46 [illegible]	84	85
18	W.	4 44 2	1 24.09[illegible]	4 45 26.[illegible]	83	84
20	E.	4 43 49	1 23.975	4 45 13.975	83	82
21	W.	4 43 [illegible]	1 23.735	4 46 23.535	82	83
25	E.	4 43 [illegible]	1 23.540	4 45 14.790	82	83
26	W.	4 43 0.5	1 23.617	4 45 24.117	82	83
27	E.	4 43 48.87	1 23.635	4 45 [illegible]	84	84
28	W.	4 44 0.37	1 23.485	4 45 [illegible]	81	85
29	E.	4 43 48.37	1 23.438	4 45 11.[illegible]	83	84
30	W.	4 44 1.62	1 23.361	4 45 24.981	85	85
May 2	E.	4 43 48.87	1 23.219	4 45 12.1[illegible]	83	83
3	W.	4 44 [illegible].62	1 23.188	4 45 25.055	82	82
5	E.	4 43 49.62	1 23.071	4 45 12.191	84	84
6	W.	4 44 [illegible]	1 23.008	4 45 24.679	85	82
7	E.	4 43 50.87	1 22.647	4 45 13.517	83	83
8	W.	4 44 [illegible].87	1 [illegible]	4 45 25.7[illegible]	82	82
				Mean	83.26	83.00

LEONIS.

Nearest point on the Limb, 8 20 N.

April 17	E.	8 18 17.[illegible]7	+ 1 31.935	8 19 [illegible]	82	80
18	W.	8 19 [illegible]	1 31.848	8 20 0.[illegible]	83	82
19	E.	8 18 20.[illegible]	1 31.751	8 19 52.501	8[illegible]	83
20	W.	8 18 [illegible].87	1 31.673	8 [illegible] 0.014	[illegible]	83
23	E.	8 18 [illegible].87	1 31.[illegible]	8 [illegible] 47.382	8[illegible]	83
24	W.	8 19 [illegible].80	1 31.3[illegible]	8 20 0.097	[illegible]	8[illegible]
25	E.	8 18 15.3[illegible]	1 31.221	8 19 46.591	84	83
26	W.	8 18 31.87	1 31.127	8 20 [illegible]	82	83
28	E.	8 18 17.37	1 30.926	8 19 18.306	8[illegible]	84
29	W.	8 18 [illegible]	30.[illegible]	8 19 [illegible]	83	83
30	E.	8 18 [illegible]	1 30.[illegible]	8 19 [illegible]	[illegible]	83
May 3	W.	8 18 3[illegible]	1 30.[illegible]	8 [illegible] 9.486	[illegible]	82
4	E.	8 18 1[illegible]	1 30.401	8 [illegible] 44.521	[illegible]	83
5	W.	8 18 35.[illegible]	1 30.316	8 20 5.[illegible]	[illegible]	83
6	E.	8 18 19.7[illegible]	1 30.231	8 19 48.07[illegible]	[illegible]	82
7	W.	8 18 3[illegible]	1 30.15[illegible]	8 20 1.[illegible]	[illegible]	8[illegible]
				Mean	82.62	82.87

THE MERIDIAN

LEONIS.

Nearest point on the Limb, 90 N.

Date.	Place.	Observed Zenith distance	Correction. +	Corrected Zenith distance	Thermometer. Upper.	Lower.
	E.	7 28 [illegible]	1 34.763	7 29 57.689	84	[illegible]
	W.	7 28 [illegible]	34.331	7 30 15.001	[illegible]	83
13	[illegible]	7 28 45.[illegible]	34.434	7 30 0.401	[illegible]	83
16	W.	7 [illegible]	1 34.360	7 30 2.809	86	84
17	E.	7 28 [illegible]	1 34.279	7 29 56.619	83	82
18	W.	7 28 [illegible]	1 34.158	7 30 0.305	8[illegible]	81
[illegible]	E.	7 28 [illegible]	1 34.088	7 29 59.328	82	82
20	W.	7 28 35.65	1 33.986	7 30 7.506	81	81
23	E.	7 28 [illegible]	1 [illegible].696	7 29 [illegible]	82	82
[illegible]	W.	7 23 [illegible]	1 33.503	7 30 8.[illegible]	82	83
25	E.	7 28 26.57[illegible]	1 33.491	7 30 0.[illegible]	83	82
28	W.	7 28 [illegible]	1 33.[illegible]	7 30 5.26	82	82
22	E.	7 28 28.87	1 33.109	7 29 59.087	84	84
29	W.	7 28 38.87	1 33.08[illegible]	7 30 11.051	83	83
30	E.	7 28 28.87	1 32.970	7 29 [illegible]	84	82
Feb. 2	W.	7 28 38.97	1 32.798	7 30 [illegible].756	81	82
4	W.	7 28 37.37	1 32.608	7 30 11.400	83	82
5	E.	7 28 24.12	1 32.605	7 30 5.621	82	82
[illegible]	W.	7 28 3[illegible]	1 32.[illegible]	7 30 11.970	83	82
7	E.	7 28 2[illegible]	1 32.303	7 29 57.779	82	82
				Mean	83.38	82.48

VIRGINIS.

Nearest point on the Limb, 3 50 N.

Date.	Place.	Observed Zenith distance	Correction. +	Corrected Zenith distance	Thermometer. Upper.	Lower.
[illegible]	W.	3 [illegible] 36.62	1 31.[illegible]	3 [illegible]	82	81
19	E.	3 [illegible] 26	1 31.2[illegible]	3 30 [illegible]	82	82
20	W.	3 [illegible]	31.[illegible]	3 [illegible] 62.[illegible]	82	81
23	E.	3 49 [illegible]	1 30.[illegible]	3 30 [illegible]	82	83
25	W.	3 [illegible]	1 30.612	3 [illegible] 6.018	81	82
[illegible]	E.	3 49 [illegible]	30.[illegible]	3 [illegible] 53.410	84	82
28	W.	3 49 [illegible]	1 30.3[illegible]1	3 [illegible] 8.[illegible]	82	84
29	E.	3 49 [illegible]	1 30.218	3 [illegible] 56.218	83	83
30	W.	3 49 [illegible]	1 30.114	3 [illegible] 6.116	82	82
31	E.	3 49 [illegible]	1 29.791	3 [illegible] 7.60[illegible]	82	82
4	W.	3 49 [illegible]	1 29.688	3 51 [illegible]	81	82
6	E.	3 49 [illegible]	1 29.678	3 50 [illegible]	82	82
6	W.	3 49 37.1[illegible]	1 29.[illegible]	3 51 6.886	81	82
7	E.	3 49 [illegible]	1 29.355	3 50 57.935	81	82
				Mean	81.[illegible]	82.1

δ SERPENTIS.

Nearest point on the Limb, 3 0 N.

1809. Month.		Face.	Observed Zenith distance. ° ′ ″	Corrections. + ′ ″	Correct Zenith distance. ° ′ ″	Thermometers. Upper °	Lower °
April	18	W.	3 1 30.76	58.269	2 9 29.019	80	79
	19	E.	3 1 26.10	58.164	3 2 18.294	3[illegible]	80
	20	W.	3 1 29.26	58.058	3 9 27.318	80	80
	23	E.	3 1 20.62	57.709	3 9 18.359	81	81
	24	W.	3 1 26.68	57.576	3 2 27.206	81	81
	25	E.	3 1 20.18	57.445	3 2 27.275	80	80
	26	W.	3 1 24.13	57.317	[illegible] 26.149	82	82
	27	E.	3 1 20.14	57.189	3 2 27.319	83	83
	28	W.	3 1 [illegible].26	57.050	3 2 29.316	84	84
	29	E.	3 1 20.13	56.921	3 2 17.051	83	83
	30	W.	3 1 29.51	56.792	3 1 29.301	83	83
May	3	E.	3 1 19.13	56.[illegible]	3 2 15.506	80	80
	5	W.	3 1 39.36	56.096	3 2 28.476	81	82
	6	E.	3 1 20.63	55.949	3 2 16.679	81	81
	7	W.	3 1 39.03	55.824	3 2 28.134	81	81
					Mean	81.[illegible]	81.13

γ SERPENTIS.

Nearest point on the Limb, 8 ° N.

April	18	W.	8 7 52.26	51.755	8 8 44.015	80	78
	19	E.	8 7 49.30	51.623	8 8 34.015	[illegible]	79
	20	W.	8 7 52.13	51.482	8 8 43.629	80	80
	23	E.	8 7 40.81	51.045	8 8 31.534	81	81
	24	W.	8 7 52.89	0.891	8 8 43.781	81	81
	25	E.	8 7 49.26	50.729	8 8 33.009	80	80
	26	W.	8 7 50.39	50.53[illegible]	8 8 46.977	82	82
	27	E.	8 7 43.64	50.49[illegible]	8 8 34.037	82	82
	28	W.	8 7 55.89	50.270	8 8 46.160	[illegible]	81
	29	E.	8 7 42.39	50.108	8 8 32.499	83	83
	30	W.	8 7 55.64	49.944	8 8 46.684	82	83
May	3	E.	8 7 44.14	49.443	8 8 33.583	80	80
	6	W.	8 7 56.89	48.938	8 8 45.928	81	81
	7	E.	8 7 46.26	48.766	8 8 36.020	81	81
					Mean	81.[illegible]	81.12

ON THE MERIDIAN.

OBSERVATIONS AT NAMTHABAD STATION.

LEONIS.

Nearest point on the Limb, [illegible] S.

Date. Month.	Face.	Observed Zenith Distance.	Corrections	Correct Zenith Distance.	Thermometers. Upper.	Thermometers. Lower.
		° ′ ″	—	° ′ ″	°	°
April 18.	W.	4 21 9.13	1 48.961	4 19 20.169	86	86
20	E.	4 21 10.85	1 48.887	4 19 20.673	83	83
21	W.	4 21 10.38	1 48.807	4 19 21.573	84	84
22	E.	4 21 10.36	1 48.761	4 19 22.499	87	87
23	W.	4 21 8.03	1 48.666	4 19 19.97	91	91
26	E.	4 21 10.13	1 48.699	4 19 21.531	93	93
26	W.	4 21 9.62	1 48.543	4 19 21.088	91	93
27	E.	4 21 10.13	1 48.489	4 19 20.643	90	90
2	W.	4 21 9.65	1 48.421	4 19 21.179	94	94
3	E.	4 21 10.80	1 48.377	4 19 20.883	93	93
	W.	4 21 9.52	1 48.318	4 19 21.312	92	92
May	E.	4 21 10.30	1 48.221	4 19 21.139	78	79
				Mean	89.2	[illegible]

REGULUS.

Nearest point on the Limb, 2° 10′ [illegible].

April [illegible]	W.	2 18 47.[illegible]	1 55.373	2 40 55.127	86	86
[illegible]	E.	2 18 38.[illegible]	1 55.264	2 11 [illegible].656	84	84
21	W.	2 19 [illegible]	1 55.189	2 10 [illegible]	88	88
22	E.	2 19 [illegible]	1 55.184	2 11 [illegible]	86	86
23	W.	2 19 [illegible]	1 55.057	2 10 45.701	89	[illegible]
[illegible]	E.	2 [illegible]	1 54.992	2 11 5.898	91	91
[illegible]	W.	2 19 44.8[illegible]	1 54.933	2 10 46.938	[illegible]	91
26	E.	2 19 [illegible]	[illegible]	2 11 5.369	[illegible]	93
27	W.	2 19 [illegible]	4.601	2 10 [illegible]	[illegible]	94
[illegible]	E.	2 19 [illegible]	[illegible]	[illegible]	[illegible]	94
[illegible]	W.	[illegible]	[illegible]	10 [illegible]	[illegible]	93
30	E.	[illegible]	[illegible]	11 [illegible]	[illegible]	93
				Mean	89.[illegible]	[illegible]

LEONIS.

Nearest point on the Limb, 5 40 N.

1811. Month.	Face.	Observed Zenith distance.	Corrections.	Corrected Zenith Distance.	Thermometer. Upper.	Thermometer. Lower.
		° ′ ″	″	° ′ ″	°	°
April 18	W.	5 41 33.15	1 56.013	5 43 29.163	71	64
20	E.	5 41 22.00	1 58.827	5 43 19.467	8[illegible]	[illegible]
21	W.	[illegible] 41 32.63	1 56.764	5 43 29.181	8[illegible]	3[illegible]
22	E.	5 41 21.13	1 56.673	5 43 18.803	86	[illegible]
23	W.	5 41 34.36	1 56.886	5 43 30.[illegible]56	8[illegible]	[illegible]
24	E.	5 41 20.36	1 56.407	5 43 [illegible].877	90	[illegible]
25	W.	5 41 36.13	1 56.411	5 43 30.641	91	91
26	E.	5 41 21.13	1 56.049	5 43 [illegible]	[illegible]	[illegible]
27	W.	5 41 33.13	1 56.341	5 43 28.9[illegible]	86	[illegible]
28	E.	5 41 23.26	1 56.149	5 43 17.4[illegible]	91	[illegible]
29	W	5 41 32.38	1 55.064	5 43 27.244	9[illegible]	[illegible]
30	E.	5 41 22.13	1 54.980	5 43 17.110	93	92
				Mean	88.[illegible]	88.8

LEONIS.

Nearest point on the Limb, 1 20 N.

April 20	E.	1 21 [illegible]	2 5.534	1 23 36.7[illegible]	80	70
21	W.	1 21 40.46	2 0.641	1 23 40.701	92	92
[illegible]	[illegible]	1 2[illegible] 8.13	2 5.348	1 [illegible] 35.478	[illegible]	85
[illegible]	W.	1 3[illegible] 0.13	2 6.266	1 23 46.286	82	81
[illegible]	E.	1 21 [illegible] 28	2 [illegible]	1 23 34.435	86	80
25	W	1 21 45.13	2 [illegible] 67	1 [illegible] 40.147	80	88
26	E.	[illegible] 30.13	2 [illegible]070	1 [illegible] 36.109	[illegible]	81
27	W.	1 21 40.13	2 [illegible]	1 23 46.003	[illegible]	93
28	E.	1 21 30.62	2 5.779	1 [illegible] 35.409	[illegible]	93
29	W	1 21 40.31	[illegible]	1 [illegible] 45.191	[illegible]	90
30	E.	1 21 28.[illegible]	2 [illegible]	1 23 [illegible]	[illegible]	90
May 4	W.	1 21 35.76	[illegible]	1 23 [illegible]	[illegible]	90
				[illegible]	87.[illegible]	[illegible]

ON THE MERIDIAN.

ZENITHS.

Nearest point on the Limb.

Date.	Face.	Observed Zenith distance.	Corrections.	Corrected Zenith distances.	Sun's centre. Upper.	Sun's centre. Lower.
		° ′ ″	″	° ′ ″	″	″
[illegible]	E.	0 [illegible] 44.19	2 9.929	[illegible]	86	83
[illegible]	[illegible]	0 [illegible]	2 8.724	[illegible]	79	79
[illegible]	[illegible]	[illegible]	2 [illegible]	[illegible] 45.135	88	81
[illegible]	[illegible]	0 [illegible] 38.6[illegible]	2 9.52[illegible]	0 [illegible] 43.162	84	84
[illegible]	[illegible]	0 [illegible] 47.36	2 9.428	0 [illegible] 38.088	81	81
[illegible]	P.	0 [illegible] 5[illegible].32	2 9.9[illegible]	0 [illegible] 40.708	87	87
[illegible]	[illegible]	[illegible] 46.09	2 9.525	0 [illegible] 38.955	88	88
[illegible]	E.	[illegible] 38.08	2 9.120	[illegible] 42.160	90	90
[illegible]	[illegible]	[illegible] 46.20	2 9.023	0 [illegible] 36.283	92	92
	E.	[illegible] 35.13	2 8.921	0 [illegible] 44.05	92	92
	W.	[illegible] 46.61	2 8.813	0 [illegible] 3.323	90	90
[illegible]	E.	0 [illegible] 38.13	2 8.701	0 [illegible] 1[illegible].231	90	90
				Mean	86.8	86.7

VIRGINIS.

Nearest point on the Lower Limb.

Date.	Face.	Observed Zenith distance.	Corrections.	Corrected Zenith distances.	Sun's centre. Upper.	Sun's centre. Lower.
[illegible] 21	W.	8 7 [illegible].13	2 6.010	[illegible] 1.120	87	86
25	E.	[illegible] 7 2[illegible].38	2 4.906	[illegible] 18.481	90	90
27	[illegible]	[illegible] 7 15.18	[illegible] 4.806	[illegible] 7.298	90	90
29	[illegible]	1 7 [illegible].26	2 4.583	[illegible] 6.677	88	88
30	W.	3 7 [illegible].301	[illegible] 4.478	[illegible] 3.021	88	88
May 3	E.	1 7 10.76	[illegible]	[illegible] 0.96	89	89
				Mean	87.6	87.33

Nearest point on the Disk, 13 N.

1811. Month.			Observed Zenith-distance.		Corrected Zenith-distance.		Upper.	Lower.
			° ′ ″		° ′ ″		″	″
May	1	W.	4 14 [illegible]	1 [illegible]	[illegible]		[illegible]	[illegible]
	2	E.	4 14 [illegible]	1 [illegible]	[illegible]		[illegible]	81
	4	W.	4 15 [illegible]	1 [illegible]	[illegible]		[illegible]	80
	5	E.	4 14 [illegible]	1 51.979	[illegible] 16 [illegible]		[illegible]	84
	7	W.	4 15 4.00	1 [illegible]	[illegible]		86	84
	8	E.	4 14 52.07	1 [illegible]	[illegible]		83	88
	9	W.	4 15 4.50	1 51.385	4 16 [illegible]		87	87
	13	E.	4 14 56.1[illegible]	1 50.881	5 13 [illegible]		88	88
						Mean	83.83	83.75

ARCTURUS.

Nearest point on the Disk, 3 S N.

May	1	E.	8 4 6	1 57.249	5 [illegible] 6.340		82	[illegible]
	[illegible]	W.	5 4 [illegible]	57.124	5 6 [illegible]		79	[illegible]
	[illegible]	E.	5 [illegible] 10.37	1 57.046	5 5 [illegible]		81	81
	4	W.	5 4 [illegible]	1 56.884	5 5 [illegible]		79	79
	5	E.	5 4 10	1 56.761	5 5 [illegible]		83	[illegible]
	8	W.	5 4 [illegible]	1 [illegible]	5 5 10.079		81	
	7	E.	5 4 9.37	1 56.398	5 5 6.568		81	
	9	W.	5 4 21	1 56.231	5 6 [illegible]		87	82
	[illegible]	E.	5 4 [illegible]	1 56.078	5 6 [illegible]		89	88
	13	W.	5 4 [illegible]	1 55.969	5 [illegible] 14.987		83	81
						Mean	[illegible]	[illegible]

BOOTIS.

Nearest point on the [illegible]

181 Months.	[illegible]	Observed [illegible]	Corrections.	[illegible] Zenith [illegible]	[illegible] Upper.	Lower.
		° ′ ″	′ ″	° ′ ″		
3		0 [illegible]	[illegible] 38 [illegible]	0 [illegible]	[illegible]	[illegible]
		[illegible]	[illegible] 38.674	0 31 [illegible].168	79	[illegible]
		[illegible]	1 38 [illegible]	0 [illegible] 21.814	[illegible]	84
	¥	[illegible]	1 38.140	[illegible]	[illegible]	[illegible]
	W.	0 [illegible]	[illegible] 37.991	0 31 [illegible]	67	77
	W.	[illegible]	[illegible] 36.849	[illegible]	[illegible]	86
				Mean	73.17	[illegible]

SERPENTIS.

Nearest point on the [illegible]

[illegible]	[illegible]	3 [illegible]	[illegible] 17.0[illegible]	[illegible]	81	[illegible]
9	[illegible]	3 56 [illegible]	1 17.[illegible]08	[illegible] 53 [illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3 [illegible] [illegible]1.0	1 17.4	[illegible]	[illegible]	[illegible]
[illegible]	W.	3 [illegible] 4	1 17 [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	E.	3 [illegible] 15.15	[illegible] 1[illegible] 04[illegible]	[illegible] 13 [illegible].057	[illegible]	[illegible]
[illegible]	W.	3 55 4.75	[illegible]	[illegible]	[illegible]	[illegible]
15	E.	[illegible] 56 1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Mean	[illegible]	[illegible]

SERPENTIS.

Nearest point on the [illegible]

May 1	E.	0 [illegible]	[illegible] 12 70[illegible]	[illegible] 266	81	[illegible]
[illegible]	W.	0 [illegible] 9[illegible]	1 12.[illegible]	[illegible] 58 3[illegible]	71	[illegible]
[illegible]	[illegible]	[illegible] 56 [illegible]	1 12 507	[illegible] 16 [illegible].307	78	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 56 [illegible].028	81	[illegible]
9	[illegible]	0 [illegible] 15.15	[illegible]	[illegible]	84	[illegible]
[illegible]	W.	0 [illegible] 26.[illegible]	1 1[illegible]	[illegible] 56 [illegible]	76	80
[illegible]	[illegible]	0 55 [illegible].30	1 [illegible]	[illegible] 38 81[illegible]	86	86
[illegible]	W.	0 55 9[illegible]	[illegible]	[illegible] 35.969	[illegible]	[illegible]
				Mean	80.13	[illegible]

[illegible] SERPENTIS.

Nearest point on the Limb, 1 10 [illegible]

1811. Month.		Face.	Observed Zenith distance.	Correction.	Corrected Zenith distance.	Transits. Upper.	Lower.
			° ′ ″	+ ″	° ′ ″	″	″
May	1	E.	1 11 [illegible]	[illegible]	[illegible]	81	[illegible]
	3	W.	1 [illegible] 17.51	1 7.332	1 12 [illegible]	81	81
	4	E.	[illegible]	1 7.669	1 14 19.542	[illegible]	76
	6	W.	1 11 [illegible]	[illegible]	[illegible]	81	81
	7	E.	1 11 10.33	[illegible]	[illegible]	81	84
	8	W.	1 11 [illegible]	[illegible]	[illegible]	80	80
	9	E.	1 11 [illegible]	1 [illegible]	[illegible]	[illegible]	86
	21	W.	1 11 [illegible]	1 5.795	[illegible]	[illegible]	84
					Mean	[illegible]	[illegible]

HERCULIS.

Near [illegible] on the Limb, 4 [illegible] N

May		E.	4 [illegible]	[illegible]	[illegible]	[illegible]	81
		W.	4 30 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		E.	4 30 [illegible]	[illegible]	[illegible]	[illegible]	81
	5	W.	4 30 [illegible]	[illegible]	[illegible]	78	78
	6	E.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7	W.	4 30 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	8	E.	4 30 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	9	W.	4 30 [illegible]	[illegible]	[illegible]	[illegible]	65
					Mean	[illegible]	[illegible]

MEASUREMENT OF AN ARC

LEONIS.

Nearest point on the Limb, 2° 45′ *N.*

1815. Month.		Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			° ′ ″	″ + −	° ′ ″	°	°
February	14	W.	2 43 5.12	3 1.598	2 46 6.718	66	66
	15	E.	2 42 50.87	3 1.578	2 45 52.448	64	64
	16	W.	2 43 2.62	3 1.559	2 46 4.179	71	70
	17	E.	2 42 53.87	3 1.538	2 45 55.408	72	72
	18	W.	2 43 5.12	3 1.511	2 46 6.631	72	72
	21	E.	2 42 51.74	3 1.411	2 45 53.151	75	75
	22	W.	2 43 4.74	3 1.377	2 46 6.117	73	73
	24	E.	2 42 53.24	3 1.292	2 45 54.532	68	68
	25	W.	2 43 1.54	3 1.261	2 46 2.801	68	69
	26	E.	2 42 50.87	3 1.220	2 45 52.090	75	75
	27	W.	2 43 7.74	3 1.183	2 46 8.923	79	79
	28	E.	2 42 52.54	3 1.136	2 45 53.676	74	74
March	2	W.	2 43 6.24	3 1.043	2 46 7.283	76	77
	3	E.	2 42 53.74	3 0.991	2 45 54.731	73	73
	4	W.	2 43 6.04	3 0.930	2 46 6.970	73	73
	5	E.	2 42 52.74	3 0.877	2 45 53.617	74	75
					Mean	72.05	72.19

LEONIS.

Nearest point on the Limb, 1° 35′ *S.*

			° ′ ″	″	° ′ ″	°	°
February	14	W.	1 36 51.76	3 19.135	1 33 32.625	65	64
	15	E.	1 37 3.01	3 19.156	1 33 45.854	64	64
	16	W.	1 36 54.01	3 19.181	1 33 34.829	71	70
	17	E.	1 37 4.26	3 19.200	1 33 45.060	71	71
	18	W.	1 36 53.63	3 19.214	1 33 34.416	71	71
	19	E.	1 37 5.13	3 19.227	1 33 45.903	73	72
	22	W.	1 36 58.26	3 19.223	1 33 34.037	70	71
	23	E.	1 37 6.26	3 19.222	1 33 47.038	71	71
	24	W.	1 36 50.26	3 19.208	1 33 31.052	68	65
	25	E.	1 37 7.13	3 19.201	1 33 47.929	68	68
	26	W.	1 36 52.26	3 19.205	1 33 33.055	74	74
	27	E.	1 37 5.26	3 19.201	1 33 46.059	75	75
March	3	W.	1 36 51.23	3 19.132	1 33 32.098	73	73
	4	E.	1 37 4.26	3 19.107	1 33 46.153	73	73
	5	W.	1 36 51.13	3 19.084	1 33 32.046	73	73
					Mean	70.5	70.3

LEONIS.

Nearest point on the Limb, 2 25 S.

Month.	Day.	Face.	Observed Zenith distance.	Corrections.	Corrected Zenith distance.	Thermometers. Upper.	Thermometers. Lower.
			° ′ ″	′ ″	° ′ ″	°	°
February	14	W.	2 26 50.26	3 25.504	28 21.756	[illegible]	[illegible]
	15	E.	2 27 4.63	3 25.544	2 23 39.089	[illegible]	[illegible]
	16	W.	2 26 50.33	3 25.578	2 23 21.502	70	70
	18	E.	2 27 3.76	3 25.640	2 23 38.120	70	70
	19	W.	2 26 51.63	3 25.671	2 23 25.963	72	72
	21	E.	2 27 4.13	3 25.709	2 23 38.423	74	75
	22	W.	2 26 51.63	3 25.713	2 23 25.917	70	70
	23	E.	2 27 7.06	3 25.713	2 23 41.357	68	68
	24	W.	2 26 45.63	3 25.710	2 23 [illegible].920	65	65
	25	E.	2 27 6.00	3 25.726	2 23 40.274	67	67
	26	W.	2 25 49.66	3 25.735	2 23 23.935	73	73
	27	E.	2 27 4.20	3 25.752	2 23 38.521	76	75
March	3	W.	2 26 48.03	3 25.719	2 23 22.011	75	74
	4	E.	2 27 6.73	3 25.703	2 23 41.054	[illegible]	74
	5	W.	2 25 49.26	3 25.693	2 23 23.567	[illegible]3	73
					Mean	70.1[illegible]	70.07

VIRGINIS.

Nearest point on the Limb, 6 5 N.

Month.	Day.	Face.	Observed Zenith distance.	Corrections.	Corrected Zenith distance.	Thermometers. Upper.	Thermometers. Lower.
January	31	W.	6 [illegible]	3 19.018	6 2 [illegible]	65	[illegible]
February	1	W.	6 6 [illegible]	3 19.131	6 2 [illegible].563	64	[illegible]
	3	E.	6 5 [illegible]	3 19.375	6 2 [illegible]	64	[illegible]
	4	W.	6 5 [illegible]	3 19.498	6 2 [illegible].002	65	66
	6	E.	6 [illegible]	3 19.611	6 2 [illegible].819	[illegible]	65
	6	W.	6 5 [illegible]	19.720	6 2 [illegible]	60	60
	7	E.	6 6 [illegible]	3 19.881	6 2 [illegible].799	58	59
	8	W.	6 [illegible] 39 [illegible]	3 19.945	6 2 [illegible].565	59	58
	9	E.	6 [illegible] 58.63	3 20.014	6 2 [illegible].896	[illegible]	62
	11	W.	6 5 [illegible]	3 20.218	6 2 37.412	[illegible]	[illegible]
	13	W.	6 6 [illegible]	3 20.394	6 2 [illegible]	[illegible]	[illegible]
	14	E.	6 [illegible]	3 20.477	6 2 38.658	61	61
	[illegible]	W.	6 6 [illegible]	3 [illegible]	6 2 [illegible]	63	[illegible]
	[illegible]	E.	6 5 [illegible]	[illegible]	6 2 38.530	70	[illegible]
	[illegible]	W.	6 [illegible] 32.08	[illegible]	6 2 [illegible]	67	[illegible]
	[illegible]	E.	6 5 57.32	0.847	6 2 [illegible]	69	70
					Mean	63.69	[illegible]4.06

MEASUREMENT OF AN ARC

BOOTIS.

Nearest point on the Limb, 1 [illegible] N.

1[illegible]		Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometer.	
Month.					Upper.	Lower.
		° ′ ″	° ′ ″	° ′ ″	°	°
February 1	W.	1 19 [illegible]	3 6.136	1 19 34.266	63	6[illegible]
2	E.	1 16 18.[illegible]	3 6.260	1 19 [illegible]	66	66
3	W.	1 16 15.63	3 0.361	1 19 21.994	6[illegible]	6[illegible]
5	E.	1 16 14.63	3 6.504	1 19 21.224	61	61
8	W.	1 16 26.62	3 6.701	1 19 33.331	59	59
9	E.	1 10 14.63	3 6.810	1 19 [illegible]	68	68
10	W.	1 16 26.63	3 6.9[illegible]	1 19 55.531	67	68
11	E.	1 16 16.63	3 6.9[illegible]	1 19 [illegible]	6[illegible]	62
12	W.	1 16 23.13	3 7.[illegible]	1 19 [illegible]	65	64
13	E.	1 16 14.26	3 7.311	1 19 [illegible]	6[illegible]	60
14	W.	1 16 27.63	3 7.388	1 19 56.018	61	61
16	E.	1 16 16.13	3 7.460	1 19 [illegible]	63	63
16	W.	1 16 [illegible]	3 7.532	1 19 [illegible]	68	69
18	W.	1 16 23.33	3 7.635	1 19 91.26[illegible]	69	67
19	E.	1 16 [illegible]	3 7.690	1 19 [illegible]	67	68
				Mean	63.07	63.27

ARCTURUS.

Nearest point on the Limb, 2 [illegible] 5 N.

		° ′ ″	° ′	° ′ ″	°	°
January 31	E.	2 5 39.76	3 [illegible]	2 8 [illegible].193	64	65
February 1	W.	2 5 41.39	3 14.573	2 8 55.953	65	66
2	E.	2 5 29.5	3 14.710	2 8 [illegible]	66	66
3	W.	2 5 25.5	3 14.825	2 8 40.3[illegible]	6[illegible]	65
4	W.	2 5 41.[illegible]	3 14.960	2 8 56.[illegible]60	6[illegible]	65
5	E.	2 5 28.13	3 15.086	2 8 [illegible].310	6[illegible]	65
6	W.	2 5 41.6	3 15.205	2 8 53.70[illegible]		60
7	E.	2 5 28.0	3 15.315	2 8 [illegible]		48
8	W.	2 5 39.13	3 15.[illegible]20	2 8 [illegible].050	[illegible]	50
9	E.	2 5 26.88	3 15.5[illegible]	2 8 [illegible].310	[illegible]	63
11	W.	2 5 39.38	3 15.7[illegible]	2 8 55.106	[illegible]	6[illegible]
12	E.	2 5 28.00	3 15.318	2 8 43.9[illegible]8	[illegible]	60
13	W.	2 5 40.13	3 15.905	2 8 [illegible]	60	60
14	E.	2 5 30.5	3 15.[illegible]99	2 8 46.[illegible]8	61	61
16	W.	2 5 [illegible]	3 16.072	2 [illegible] 57.67	6[illegible]	6[illegible]
15	E.	2 [illegible]	3 16.1[illegible]8	2 [illegible]	6[illegible]	70
17	W.	2 [illegible]	3 16.[illegible]	2 [illegible] 56.7	6[illegible]	6[illegible]
18	E.	2 [illegible]	3 16.[illegible]72	2 3 45.[illegible]	6[illegible]	66
19	W.	3 [illegible]	3 16.[illegible]71	2 3 61.[illegible]	66	67
				Mean	63.[illegible]	[illegible]

ON THE MERIDIAN.

BOOTIS.

Nearest point on the Limb, 3 59 S.

1816. Month	Face.	Observed Zenith Distance.	Corrections.	Corrected Zenith Distance.	Thermometers. Upper	Thermometers. Lower
February 13	W.	3 31 31.65	2 15.086	3 29 46.344	59	59
14	E.	3 31 42.63	2 35.189	3 29 67.441	60	60
15	W.	3 31 27.15	2 15.294	3 29 41.[illegible]	61	61
17	E.	3 31 46.[illegible]	2 45.67[illegible]	3 29 30.566	68	68
18	W.	3 31 28.03	2 30.669	3 29 43.067	66	66
19	E.	3 31 49.01	2 45.653	3 29 56.357	66	67
21	W.	3 31 30.06	2 46.805	3 29 44.265	68	69
22	E.	3 31 41.76	2 46.869	3 29 58.901	67	66
23	W.	3 31 34.13	2 15.905	3 28 49.923	63	64
24	E.	3 31 46.13	2 45.971	3 28 59.160	61	61
25	W.	3 31 26.76	2 46.028	3 28 42.732	65	65
26	E.	3 31 47.13	2 46.081	3 29 1.049	68	6[illegible]
				Mean	64.39	64.[illegible]

SERPENTIS.

Nearest point on the Limb, 6 55 S.

February 16	W.	6 53 13.[illegible]	2 19.086	6 51 [illegible].669	61	[illegible]
17	E.	6 53 33.[illegible]	2 19.304	6 51 [illegible].160	66	[illegible]
18	W.	6 53 16.97	2 19.417	6 51 [illegible]	65	[illegible]
20	W.	6 53 [illegible]	2 19.605	6 51 4.935	74	7[illegible]
2[illegible]	E.	6 53 [illegible].12	2 19.697	6 51 20.423	67	67
2[illegible]	W.	[illegible] 55 16.24	2 19.780	6 51 5.460	65	66
[illegible]	E.	6 53 34.27	2 19.865	6 51 21.595	[illegible]	[illegible]
24	W.	6 53 16.[illegible]	2 19.950	6 51 3.700	[illegible]	[illegible]
25	E.	6 53 35.73	2 20.028	6 51 22.7[illegible]	65	[illegible]
26	W.	6 53 [illegible]	2 [illegible].02	6 51 2.7[illegible]	[illegible]	[illegible]
28	E.	6 53 35.7[illegible]	2 20.246	6 51 20.02[illegible]	68	[illegible]
March 1	W.	6 53 34.[illegible]	2 20.318	6 51 21.3[illegible]	66	[illegible]
2	W.	6 53 16.47	2 20.371	6 51 [illegible].098	66	[illegible]
3	E.	6 53 34.74	2 20.4[illegible]	[illegible]	67	[illegible]
4	W.	6 53 18.17	2 20.472	6 51 [illegible].89[illegible]	66	66
5	E.	6 53 36.67	2 20.5[illegible]4	6 51 [illegible]	[illegible]	66
				Mean	66.06	66.[illegible]

SERPENTIS.

Nearest point on the Limb, 2° 5′ S.

1815. Month.	Face.	Observed Zenith Distance.	Corrections.	Correct Zenith Distance.	Thermometers. Upper.	Thermometers. Lower.
February 16	W.	2 2 45.74	2 6.408	2 0 40.334	60	60
17	E.	2 3 1.67	2 5.428	2 0 56.242	66	66
18	W.	2 2 46.87	2 5.734	2 0 41.136	64	64
19	E.	2 3 1.94	2 5.938	2 0 55.409	65	65
20	W.	2 2 43.74	2 5.925	2 0 10.815	71	71
21	E.	2 3 1.87	2 5.999	2 0 55.881	69	69
22	W.	2 2 47.94	2 6.094	2 0 41.149	65	65
23	E.	2 3 2.07	2 6.167	2 0 56.503	63	63
24	W.	2 2 48.74	2 6.239	2 0 42.501	61	61
25	E.	2 3 2.07	2 6.312	2 0 56.558	64	64
26	W.	2 2 46.94	2 6.387	2 0 40.553	69	69
28	E.	2 3 4.67	2 6.518	2 0 58.152	68	68
March 2	W.	2 2 45.44	2 6.624	2 0 39.816	68	68
3	E.	2 3 0.87	2 6.666	2 0 54.204	67	67
4	W.	2 2 46.14	2 6.707	2 0 39.433	66	66
5	E.	2 3 0.94	2 6.746	2 0 54.193	65	65
				Mean	67.81	68.87

SERPENTIS.

Nearest point on the Limb, 1° 25′ S.

February 15	E.	1 47 6.51	1 58.061	1 45 8.449	60	60
16	W.	1 46 43.03	1 58.177	1 44 50.153	60	60
17	E.	1 47 5.76	1 58.405	1 45 7.355	65	65
19	W.	1 46 49.51	1 58.624	1 44 50.886	65	65
20	E.	1 47 4.13	1 58.715	1 45 5.417	72	72
21	W.	1 46 50.63	1 58.804	1 44 51.829	69	69
22	E.	1 47 5.26	1 58.985	1 45 6.375	66	66
23	W.	1 46 50.93	1 59.065	1 44 51.865	63	63
24	E.	1 47 5.63	1 59.158	1 45 6.472	60	61
25	W.	1 46 [illegible].76	1 59.115	1 44 51.645	64	64
26	E.	1 47 5.83	1 59.193	1 45 6.637	69	70
28	W.	1 46 52.53	1 59.321	1 44 53.308	68	68
March 1	E.	1 47 6.03	1 59.391	1 45 7.639	68	68
2	W.	1 46 53.15	1 59.438	1 44 53.692	68	68
3	E.	1 47 3.76	1 59.483	1 45 4.277	67	67
4	W.	46 51.46	1 59.525	1 44 51.735	66	66
5	E.	47 5.46	1 59.567	1 45 5.893	66	66
				Mean	66.05	66.82

ON THE MERIDIAN,

HERCULIS

Nearest point on the Limit, 1 30 N.

Date.		Face.	Observed Zenith Distances.	Corrections.	Corrected Zenith Distances.	Thermometers.	
Month.						Upper.	Lower.
			° ′ ″		° ′ ″	°	°
February	17	E.	1 34 7.610	1 39.973	1 33 47.682	68	68
	19	W.	1 32 59.660	1 46.157	1 33 53.737	65	65
	20	E.	1 32 7.130	1 40.266	1 33 47.416	71	71
	21	W.	1 32 59.810	1 46.386	1 33 0.196	68	68
	22	E.	1 34 7.260	1 40.480	1 33 47.780	66	66
	23	W.	1 32 19.800	1 46.872	1 31 0.982	63	63
	24	E.	1 32 4.180	1 40.663	1 33 46.618	60	60
	25	W.	1 32 19.450	1 46.731	1 34 0.201	63	63
	26	E.	1 32 5.150	1 40.879	1 33 46.268	69	70
	28	W.	1 32 31.70	1 46.987	1 31 2.717	67	67
March	1	E.	1 32 6.16	1 41.050	1 33 47.190	68	66
	2	W.	1 32 29.26	1 41.087	1 34 22.241	66	66
	3	E.	1 32 5.46	1 41.126	1 33 46.568	67	67
	4	W.	1 32 31.89	1 41.179	1 32 3.060	66	66
	5	E.	1 32 4.76	1 41.210	33 46.370	66	65
					Mean	65.22	66.13

11. Means of the Zenith distances, taken on the right and left, corrected for refraction, equation of the lectorial tube, and the measures of the micrometer.

ZENITH DISTANCE PUNNAE STATION.

LEONIS.

1809. Month.	Left Arc.	1809. Month.	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
April 13	2 36 56.661	April 12	2 36 45.100	2 23 49.362
16	53.928	14	43.590	Refraction, &c. + 2.562
18	54.210	17	43.535	
20	54.116	19	43.161	Zenith distance, 2 36 51.925
22	54.307	23	42.730	
26	55.074	24	43.870	
28	56.101	27	43.643	
30	56.747	29	42.799	
May 3	56.772	May 2	42.406	
6	57.570	5	41.365	
		7	41.046	
Mean	2 36 55.109	Mean	2 36 43.645	

REGULUS.

April 13	4 46 23.349	April 12	4 46 16.280	4 46 19.176
14	23.581	14	16.481	Refraction, &c. + 2.697
16	23.023	17	15.017	
24	22.235	20	12.976	Zenith distance, 4 46 21.873
26	24.117	25	13.789	
28	23.856	27	12.410	
30	24.981	29	11.703	
May 3	20.080	May 2	13.4[illegible]	
6	21.578	5	12.191	
8	20.769	7	1[illegible]	
Mean	4 46 22.892	Mean	4 46 13.459	

ON THE MERIDIAN.

LEONIS.

1809. Month.	Left Asc.	1809. Month.	Right Asc.	Mean.
April 19	8 19 6.718	April 17	8 19 49.[illegible]	8 19 51.97[illegible]
21	60.5[illegible]	18	52.[illegible]	Refraction &c. + [illegible]
23	60.[illegible]	23	52.[illegible]	
25	62.097	27	[illegible]	Zenith Dist. 8 20 5.913
29	[illegible]	28	48.[illegible]	
May 3	63.400	31	48.39	
5	63.566	May 4	46.621	
[illegible]	[illegible]	6	48.071	
Mean	8 20 1.9[illegible]	Mean	8 19 48.70[illegible]	

β LEONIS.

April 1	7 30 [illegible]	April 13	7 [illegible] 57.188	7 30 [illegible]
16	[illegible]	14	59.564	Refraction, &c. + 7.6[illegible]
18	[illegible]	17	58.049	
20	[illegible]	20	58.[illegible]	Zenith Dist. 7 30 1.4[illegible]
22	[illegible]	23	59.660	
26	[illegible]	25	60.365	
28	[illegible]	28	[illegible]	
May 2	[illegible]	30	[illegible]	
4	[illegible]	May 6	95.625	
6	[illegible]	7	97.779	
Mean	7 30 9.819	Mean	7 29 [illegible]	

VIRGINIS.

April 18	[illegible]	April 10	[illegible] 50 [illegible]	[illegible]
20	[illegible]	9	50.815	Refraction, &c. + 3.888
[illegible]	[illegible]	[illegible]	56.[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	Zenith Dist. [illegible] 5 [illegible] 6.0[illegible]
30	[illegible]	May 3	57.06[illegible]	
May 6	[illegible]	6	56.82[illegible]	
6	[illegible]	7	[illegible]	
Mean	[illegible] 7.440	Mean	[illegible] 50.[illegible]	

SERPENTIS.

April 19	[illegible] 59.02[illegible]	April [illegible]	[illegible] 2[illegible]	[illegible]
20	57.[illegible]	[illegible]	[illegible]	Refraction, &c. [illegible] 0.929
21	[illegible]	[illegible]	[illegible]	
26	59.477	21	[illegible]	Zenith Dist. [illegible] 2 [illegible]
28	59.318	22	17.031	
[illegible]	59.[illegible]	May [illegible]	[illegible]	
May [illegible]	[illegible]	3	16.578	
9	58.13[illegible]			
Mean	[illegible] 58.[illegible]	Mean	[illegible] 2.217	

SERPENTIS.

1809. Month.	Left Arc.	1809. Month.	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
April 18	8 8 44.015	April 19	8 8 34.013	8 8 39.337
20	43.622	23	31.553	Refraction, &c. + 7.932
24	43.781	25	33.009	
26	46.977	27	34.067	Zenith Dist. 8 8 47.269
28	46.160	29	32.498	
30	46.384	May 3	33.583	
May 6	45.828	7	35.026	
Mean	8 8 45.281	Mean	8 8 33.393	

ZENITH DISTANCES AT NAMTHABAD.

LEONIS.

April 20	4	19	30.673	April 18	4	19	20.169	4 19 25.808
22			29.499	21			21.573	Refraction, &c. + 4.271
25			31.531	24			19.974	
27			30.642	26			21.088	Zenith Dist. 4 19 30.079
29			30.883	28			21.199	
May 2			31.159	30			21.312	
Mean	4	19	30.731	Mean	4	19	20.886	

REGULUS.

April 20	2	11	3.636	April 18	2	10	52.137	2 10 57.276
22			4.766	21			50.571	Refraction, &c. + 2.207
24			3.898	23			49.703	
26			3.369	25			49.938	Zenith Dist. 2 10 59.483
28			4.140	27			49.939	
30			3.017	29			52.203	
Mean	2	11	3.804	Mean	2	10	50.749	

LEONIS.

April 18	5	43	29.148	April 20	5	43	16.467	5 43 23.138
21			29.384	22			16.803	Refractions, &c. + 5.566
23			30.146	24			15.877	
25			30.541	26			16.459	Zenith Dist. 5 43 28.704
27			28.371	28			17.409	
29			27.944	30			17.110	
Mean	5	43	29.256	Mean	5	43	17.021	

LEONIS.

1811. Month	Left Ass.	Month	Right Ass.	Mean
April 4	[illegible]	April [illegible]	1 33 [illegible]	1 23 40.782
[illegible]	38.388	[illegible]	[illegible].478	Refraction, &c. [illegible].358
[illegible]	[illegible]	[illegible]	[illegible]	
27	48.005	[illegible]	[illegible]	Zenith Distance, 1 33 [illegible].2038
[illegible]	[illegible]	29	35.509	
May 4	[illegible]	30	34.716	
Mean	[illegible] 36.212	Mean	1 [illegible] 35.[illegible]7	

β LEONIS.

April 18	0 [illegible] [illegible]2.054	April 20	0 32 43.484	0 33 [illegible]
21	35.136	22	38.112	Refraction, &c. + 0.416
23	36.388	24	40.708	
25	36.236	26	42.140	Zenith Distance, 0 33 [illegible]
27	38.283	28	44.051	
29	38.323	30	41.85[illegible]	
Mean	0 33 [illegible]4.363	Mean	0 33 42.365	

VIRGINIS.

April 26	[illegible] 18.435	April 28	[illegible] 4.120	[illegible]
29	[illegible].677	29	7.398	Refraction, &c. + 2.960
May 3	10.[illegible]	30	8.[illegible]	
Mean	[illegible] 16.919	Mean	3 [illegible] 6.080	Zenith Dist. [illegible]

BOOTIS.

May 3	4 [illegible] 54.[illegible]	May 3	4 16 [illegible].10[illegible]	4 16 [illegible]
4	54.[illegible]	5	44.810	Refraction, &c. [illegible] 4.9[illegible]
7	[illegible].66[illegible]	8	35.582	
9	55.36[illegible]	12	45.001	Zenith Dist. 4 [illegible] 54.40[illegible]
Mean	4 16 [illegible]	Mean	4 16 45.358	

ARCTURUS.

May [illegible]	[illegible] 2 18.[illegible]	May 1	5 6 [illegible].310	5 6 [illegible].668
4	18.685	3	7.210	Refraction, &c. + [illegible]
6	[illegible].079	[illegible]	[illegible]	
8	[illegible]	7	6.260	Zenith Distance, 5 6 16.77
15	[illegible]	[illegible]	5.940	
Mean	5 6 16.790	Mean	5 6 6.540	

μ BOOTIS.

1811. Month.	Left Arc.	1811. Month.	Right Arc.	Mean.	
	° ′ ″		° ′ ″		° ′ ″
May 3	0 31 39.158	May 4	0 31 31.166		0 31 35.196
5	41.814	7	29.600	Refraction, &c.	+ 0.672
8	39.899	15	29.541		
Mean	0 31 40.290	Mean	0 31 30.102	Zenith Distance,	0 31 35.868

δ SERPENTIS.

May 1	3 53 57.264	May 3	3 53 48.902		3 53 52.382
4	56.544	5	46.679	Refraction, &c.	+ 3.908
7	58.087	9	47.989		
15	55.731			Zenith Distance,	3 53 56.290
Mean	3 53 56.906	Mean	3 53 47.857		

δ SERPENTIS.

May 3	0 56 35.097	May 1	0 56 27.295		0 56 31.745
5	36.648	4	28.207	Refraction, &c.	+ 0.901
8	36.908	7	26.947		
15	35.952	9	26.814	Zenith Distance,	0 56 32.646
Mean	0 56 36.141	Mean	0 56 27.338		

ε SERPENTIS.

May 3	1 12 24.342	May 1	1 12 18.286		1 12 21.613
5	27.266	4	19.549	Refraction, &c.	+ 1.105
8	26.021	7	17.554		
15	26.916	9	17.467	Zenith Distance,	1 12 23.718
Mean	1 12 26.886	Mean	1 12 18.339		

HERCULIS.

May 2	4 31 19.468	May 1	4 31 9.205		4 31 14.631
4	19.359	3	10.287	Refraction, &c.	+ 4.472
7	20.186	5	8.914		
9	20.684	8	8.872	Zenith Distance,	4 31 19.103
Mean	4 31 19.924	Mean	4 31 9.337		

ZENITH DISTANCES AT DAUMERGIDDA.

LEONIS.

1845. Month.		Left Arc. ° ′ ″	1845. Month.		Right Arc. ° ′ ″	Mean. ° ′ ″
Feb.	15	7 16 51.860	Feb.	14	7 16 39.769	7 16 45.874
	17	54.289		16	40.690	Refraction, &c. + 7.359
	19	51.485		18	41.017	
	23	54.364		22	36.178	Zenith Distance, 7 16 53.233
	25	54.525		24	37.269	
	27	54.397		26	34.981	
March	1	53.877		28	36.454	
	4	55.057	March	3	38.051	
				5	37.724	
Mean		7 16 53.732	Mean		7 16 38.016	

REGULUS.

Feb.	15	5 8 23.502	Feb.	14	5 8 10.525	5 8 16.466
	17	21.199		16	12.457	Refraction, &c. + 5.116
	19	22.524		18	10.928	
	22	23.977		21	10.888	Zenith Distance, 5 8 21.582
	24	24.370		25	8.165	
	26	22.861		27	8.856	
	28	22.721	March	3	8.629	
March	4	23.491		5	8.363	
Mean		5 8 23.081	Mean		5 8 9.854	

γ LEONIS.

Feb.	14	2 46 6.718	Feb.	15	2 45 52.448	2 46 0.198
	16	4.179		17	55.408	Refraction, &c. + 2.858
	18	6.631		21	53.151	
	22	6.117		24	54.532	Zenith Distance, 2 46 3.056
	25	2.801		26	52.090	
	27	6.923		28	53.676	
March	2	7.283	March	3	54.731	
	4	6.970		5	53.617	
Mean		2 46 6.689	Mean		2 45 53.707	

MEASUREMENT OF ARC

α LEONIS.

1816. Month.		Left Arc.	1816. Month.		Right Arc.	Mean.		
		° ′ ″			° ′ ″		° ′ ″
Feb.	15	1 33 43.864	Feb.	14	1 33 32.025		1 33 38.445
	17	45.060		16	31.820	Refraction, &c.	+ 1.478
	19	45.903		18	30.416		
	22	47.038		22	31.037	Zenith Distance,	1 33 40.923
	25	47.929		24	31.062		
	27	46.069		26	33.055		
March	1	45.153	March	3	32.098		
				5	35.046		
		1 33 45.999		Mean	1 33 32.395		

β LEONIS.

Feb.	15	2 23 39.086	Feb.	14	2 23 24.756		2 23 32.008
	18	38.140		16	24.802	Refraction, &c.	+ 2.316
	21	38.428		19	25.959		
	23	41.347		22	25.917	Zenith Distance,	2 23 34.324
	25	40.274		24	23.920		
	27	38.531		26	22.925		
March	6	41.055	March	3	22.911		
				5	23.567		
	Mean	2 23 39.[illegible]		Mean	2 23 24.470		

γ VIRGINIS.

Feb.	3	6 2 37.125	Jan.	31	6 2 21.988		6 2 30.182
	5	38.319	Feb.	1	23.866	Refraction, &c.	+ 6.082
	7	40.700		4	24.002		
	9	38.980		5	23.410	Zenith Dist.	6 2 36.270
	11	37.412		8	19.555		
	14	38.653		13	23.736		
	17	38.650		15	21.935		
	19	37.043		18	22.107		
	Mean	6 2 38.336		Mean	6 2 22.639		

ρ BOOTIS.

Feb.	1	1 19 34.906	Feb.	2	1 19 24.380		1 19 28.157
	6	33.321		3	21.994	Refraction, &c.	+ 1.182
	8	33.531		5	21.224		
	11	35.292		7	21.410	Zenith Dist.	1 19 29.339
	14	35.018		9	23.046		
	16	34.169		13	21.571		
	18	31.265		15	22.590		
				19	22.820		
	Mean	1 19 33.630		Mean	1 19 22.456		

IN THE MERIDIAN.

ARCTURUS.

1815. Month.		Left Arc.	1815. Month.		Right Arc.	Mean.
		° ′ ″			° ′ ″	° ′ ″
Jan.	31	2 8 54.193	Feb.	2	2 8 44.210	2 8 49.436
Feb.	1	55.953		3	40.133	Refraction, &c. + 2.066
	4	55.460		5	43.216	
	6	56.706		7	45.315	Zenith Dist. 2 8 51.502
	8	54.560		9	4[illegible].410	
	11	55.106		12	4[illegible].818	
	13	56.035		14	4[illegible].488	
	15	57.372		16	4[illegible].148	
	17	55.713		18	42.652	
	19	51.304				
Mean		2 8 55.362	Mean		2 8 43.310	

BOOTIS.

Feb.	11	3 28 57.441	Feb.	13	3 29 46.544	3 28 51.692
	17	59.656		15	51.856	Refraction, &c. + 3.4[illegible]
	19	56.357		13	43.067	
	22	58.901		21	4[illegible].265	Zenith Dist. 3 23 [illegible]
	24	59.150		23	48.022	
	26	61.049		26	44.732	
Mean		3 28 5[illegible].771	Mean		3 28 45.443	

SERPENTIS.

Feb.	17	6 51 21.186	Feb.	15	6 51 1.654	6 51 [illegible].624
	21	20.173		18	3.663	Refraction, &c. + 7.018
	23	21.505		20	4.955	
	25	22.712		22	6.460	Zenith Dist. 6 51 [illegible].336
	28	20.061		24	5.790	
March	1	[illegible].355		2[illegible]	2.769	
	3	20.318	March	4	1.909	
	5	97.266		6	4.898	
Mean		6 51 [illegible]	Mean		6 51 3.682	

β SERPENTIS.

Feb.	1[illegible]	2 0 56.924	Feb.	15	2 0 40.134	2 0 48.097
	[illegible]	56.402		16	41.126	Refraction, &c. + 2.[illegible]0
	21	55.661		20	40.816	
	23	56.503		22	41.149	Zenith Dist. 2 0 50.287
	25	55.558		23	49.601	
	28	55.185		26	40.357	
March	3	54.20[illegible]	March	2	37.616	
	5	53.192		4	38.503	
Mean		2 0 55.889	Mean		2 0 40.303	

γ SERPENTIS.

1815. Month.	Left Arc.	1815. Month.	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
14	1 45 8.449	Feb. 15	1 44 50.153	1 44 59.207
17	7.354	19	50.886	Refraction, &c. + 1.558
20	5.417	21	51.829	
22	6.375	23	51.964	Zenith Dist. 1 45 0.865
24	6.592	25	51.645	
26	6.587	28	53.308	
March 1	7.569	March 2	53.692	
3	4.277	4	51.735	
5	5.893			
Mean	1 45 6.513	Mean	1 44 51.901	

γ HERCULIS.

Feb. 19	1 33 59.757	Feb. 17	1 33 47.583	1 33 54.074
21	60.193	20	47.415	Refraction, &c. + 1.395
23	60.462	22	47.740	
25	60.201	24	45.618	Zenith Dist. 1 33 55.469
28	62.717	26	45.959	
March 2	63.341	March 1	47.190	
4	63.060	3	46.586	
		5	45.970	
Mean	1 34 1.391	Mean	1 33 46.758	

12. AMPLITUDE OF THE ARC

Between Namthabad and Daumergidda.

Stars.	Zenith Distances at Namthabad.	Zenith Distances at Daumergidda.	Amplitude.
	° ′ ″	° ′ ″	° ′ ″
ε Leonis,	4 19 30.079 S.	7 16 53.233 S.	2 57 23.154
Regulus,	2 10 59.483 S.	5 8 21.582 S.	22.099
γ Leonis,	5 43 28.704 N.	2 46 3.056 N.	25.648
δ Leonis,	1 23 42.038 N.	1 33 49.925 S.	22.063
β Leonis,	0 33 49.174 N.	2 23 34.324 S.	23.498
ε Virginis,	3 5 14.750 S.	6 2 35.57 S.	21.820
η Bootis,	4 16 54.45 N.	1 19 29.355 N.	25.165
Arcturus,	5 6 16.777 N.	2 8 51.502 N.	25.275
ε Bootis,	0 31 35.868 S.	3 28 55.050 S.	19.182
δ Serpentis,	3 53 56.29 S.	6 51 19.536 S.	23.246
β Serpentis,	0 56 32.646 N.	2 0 50.287 S.	22.933
γ Serpentis,	1 12 23.718 N.	1 45 0.865 S.	24.583
γ Herculis,	4 31 19.103 N.	1 33 55.469 S.	23.634
		Mean	3 57 23.320

13. AMPLITUDE OF THE ARC

between Punnae and Daumergidda, by seven corresponding Stars.

Stars.	Zenith Distances at Punnae.	Zenith Distances at Daumergidda.	Amplitude.
	° ′ ″	° ′ ″	° ′ ″
1 Leonis, [illegible]	2 30 51.926 N.	1 16 53.232 S.	0 53 46.159
[illegible]	4 45 23.979 N.	8 21.582 S.	46.561
2 Leonis	8 20 2.213 N.	33 40.926 S.	44.138
3 Leonis	7 30 11.600 N.	23 34.324 S.	46.932
[illegible] Virginis	3 51 6.083 N.	2 36.670 S.	42.653
[illegible]	3 9 26.643 N.	0 31 19.336 S.	45.179
γ Serpentis	8 0 47.269 N.	1 45 0.865 S.	48.134
		Mean.	9 53 45.257

14. *Celestial Arc* between the parallels of *Punchapolliam* and *Nunthabad*, (see A. R. Vol. 12. 350) - - 4° 6′ 11″.28

Terestrial Arc, (see Art. 9, of the present paper,) - FEET. 1489131.2

Mean length of one degree, - - FATHOMS. 60487.56

Latitude of the middle point - - - 13° 2′.55

Celestial Arc between the parallels of *Nunthabad* and *Daumergidda*, - - - - - 2° 57′ 23″.32

Terestrial Arc, - - - - - FEET. 1073428.2

Mean length of one degree, - - FATHOMS. 60512.78

Latitude of the middle point, - - - 16° 34′ 42″

15. It appears by the comparison of the celestial with the terestrial arcs, that the degree due to latitude 9° 34′ 4″ is 60472.83 fathoms; that due to latitude 13° 2′ 55″ is 60487.56 fathoms. And that due to latitude 16° 34′ 42″ is 60512.78 fathoms.

Now in order to obtain a general mean for the ratio of the polar axis to the equatorial diameter of the earth, let each of these be taken separately, *first*, with the French measure; *then* with the English, and *lastly* with the Swedish, which will produce three *means*; from which three, the *general* mean is had. If the formula in page 93, Asiatick Researches, Vol. 12th, be referred to, and the respective latitudes, and the degrees due to them, be substituted, we shall have the results as follows:

First, with the French measurement in latitude 47° 24′ 0″

$$\frac{1}{1+e}\;\frac{\sqrt{\text{Cos.}^2(0^\circ\ 34'\ 44'') - \text{Cos.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60472.83}\right)^{\frac{2}{3}}}}{\sqrt{\text{Sin.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60472.83}\right)^{\frac{2}{3}} - \text{Sin.}^2(0^\circ\ 34'\ 44'')}} = \frac{1}{1.0034502}$$

$$\frac{1}{1+e}\;\frac{\sqrt{\text{Cos.}^2(13^\circ\ 2'\ 55'') - \text{Cos.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60487.56}\right)^{\frac{2}{3}}}}{\sqrt{\text{Sin.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.\ 0}{60487.56}\right)^{\frac{2}{3}} - \text{Sin.}^2(13^\circ\ 2'\ 55'')}} = \frac{1}{1.0034636}$$

$$\frac{1}{1+e}\;\frac{\sqrt{\text{Cos.}^2(16^\circ\ 34'\ 42'') - \text{Cos.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60512.78}\right)^{\frac{2}{3}}}}{\sqrt{\text{Sin.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60512.78}\right)^{\frac{2}{3}} - \text{Sin.}^2(16^\circ\ 34'\ 42'')}} = \frac{1}{1.0033787}$$

The Mean of which is $\frac{1}{1.0034295}$

Second, with the English, in latitude 52° 2′ 20″

$$\frac{1}{1+e}\;\frac{\sqrt{\text{Cos.}^2(0^\circ\ 34'\ 44'') - \text{Cos.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60472.83}\right)^{\frac{2}{3}}}}{\sqrt{\text{Sin.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60472.83}\right)^{\frac{2}{3}} - \text{Sin.}^2(0^\circ\ 34'\ 44'')}} = \frac{1}{1.0032218}$$

$$\frac{1}{1+e}\;\frac{\sqrt{\text{Cos.}^2(13^\circ\ 2'\ 55'') - \text{Cos.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60487.56}\right)^{\frac{2}{3}}}}{\sqrt{\text{Sin.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60487.56}\right)^{\frac{2}{3}} - \text{Sin.}^2(13^\circ\ 2'\ 55'')}} = \frac{1}{1.0032102}$$

$$\frac{1}{1+e}\;\frac{\sqrt{\text{Cos.}^2(16^\circ\ 34'\ 42'') - \text{Cos.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820}{60512.78}\right)^{\frac{2}{3}}}}{\sqrt{\text{Sin.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60512.78}\right)^{\frac{2}{3}} - \text{Sin.}^2(16^\circ\ 34'\ 42'')}} = \frac{1}{1.0031420}$$

The Mean of which is $\frac{1}{1.002.913}$

Third, with the Swedish measure in latitude 66° 20′ 12″

$$\frac{\sqrt{\mathrm{Cos.}^2(16^\circ\ 34'\ 42'') - \mathrm{Cos.}^2(66^\circ\ 20'\ 12'') \cdot \left(\frac{60988.}{60487.33}\right)^2}}{1+e\ \sqrt{\mathrm{Sin.}^2(66^\circ\ 20'\ 12'') \cdot \left(\frac{60988.}{60487.33}\right)^2 - \mathrm{Sin.}^2(16^\circ\ 34'\ 42'')}} \quad \frac{1}{1.0032702}$$

$$\frac{\sqrt{\mathrm{Cos.}^2(13^\circ\ 2'\ 55'') - \mathrm{Cos.}^2(66^\circ\ 20'\ 12'') \cdot \left(\frac{60988.}{60487.56}\right)^2}}{1+e\ \sqrt{\mathrm{Sin.}^2(66^\circ\ 20'\ 12'') \cdot \left(\frac{60988.}{60487.56}\right)^2 - \mathrm{Sin.}^2(13^\circ\ 2'\ 55'')}} \quad \frac{1}{1.0032653}$$

$$\frac{\sqrt{\mathrm{Cos.}^2(16^\circ\ 34'\ 42'') - \mathrm{Cos.}^2(66^\circ\ 20'\ 12'') \left(\frac{60988}{60518.78}\right)^2}}{1+e\ \sqrt{\mathrm{Sin.}^2(66^\circ\ 20'\ 12'') \cdot \left(\frac{60988}{60518.78}\right)^2 - \mathrm{Sin.}^2(16^\circ\ 34'\ 42'')}} \quad \frac{1}{1.0032102}$$

The Mean of which is $\frac{1}{1.0032479}$

Hence by comparing these three measurements in India, with the French, gives $\frac{1}{1.0034295}$

With the English, gives $\frac{1}{1.0031913}$

With the Swedish, gives $\frac{1}{1.0032479}$

And the *general* mean is $\frac{1}{1.0032290}$

Which gives the compression $\frac{1}{303.99}$ or $\frac{1}{304}$ nearly

18. All this is supposing the earth to be an ellipsoid, but, it will be proper to determine that question from the Indian measurements alone without having recourse to any other. In order to which, let x, x_1, x_2, &c. be the measures of a, a_1, a_2 degrees on the meridian, whose

respective latitudes are $\overset{(1)}{l}, \overset{(2)}{l}, \overset{(3)}{l}$, &c. Then it is known that if the figure of the earth be an ellipse, $\dfrac{\overset{(2)}{X} - \overset{(1)}{X}}{3\overset{(1)}{X}(\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l})}$ will express the compression; let the ratio of the polar to the equatorial diameter be β what it will. Hence $\dfrac{\overset{(3)}{X} - \overset{(1)}{X}}{3\overset{(1)}{X}(\sin.^2 \overset{(3)}{l} - \sin.^2 \overset{(1)}{l})}$ is also equal the same compression; and therefore $\dfrac{\overset{(3)}{X} - \overset{(1)}{X}}{3\overset{(1)}{X}(\sin.^2 \overset{(3)}{l} - \sin.^2 \overset{(1)}{l})} = \dfrac{\overset{(2)}{X} - \overset{(1)}{X}}{3\overset{(1)}{X}(\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l})}$.

And by reduction, $\overset{(3)}{X} = \overset{(1)}{X} + (\overset{(2)}{X} - \overset{(1)}{X}) \cdot \left\{\dfrac{\sin.^2 \overset{(3)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\}$

And also $\overset{(4)}{X} = \overset{(1)}{X} + (\overset{(2)}{X} - \overset{(1)}{X}) \cdot \left\{\dfrac{\sin.^2 \overset{(4)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\}$

$$\overset{(5)}{X} = \overset{(1)}{X} + (\overset{(2)}{X} - \overset{(1)}{X}) \cdot \left\{\dfrac{\sin.^2 \overset{(5)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\} \text{ &c.}$$

And therefore $\overset{(n)}{X} = \overset{(1)}{X} + (\overset{(2)}{X} - \overset{(1)}{X}) \cdot \left\{\dfrac{\sin.^2 \overset{(n)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\}$.

Also by descending $\overset{(3)}{X} = \overset{(1)}{X} + (\overset{(2)}{X} - \overset{(1)}{X}) \cdot \left\{\dfrac{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(3)}{l} - \sin.^2 \overset{(1)}{l}}\right\} = \overset{(1)}{X} - (\overset{(2)}{X} - \overset{(1)}{X})$

And $\overset{(1)}{X} = \overset{(1)}{X} + (\overset{(2)}{X} - \overset{(1)}{X}) \cdot \left\{\dfrac{\sin.^2 \overset{(1)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\} = \overset{(1)}{X} + 0$

So that if $\overset{(1)}{X} - \overset{(1)}{X}$ be expressed by x, we shall have

$$x = X + \ldots$$

$$\overset{(2)}{X} = \overset{(1)}{X} + d\left\{\frac{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\}$$

$$\overset{(4)}{X} = \overset{(1)}{X} + d\left\{\frac{\sin.^2 \overset{(4)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\} \text{ &c.}$$

$$\ldots \text{ to } \overset{(n)}{X} = \overset{(1)}{X} + d\left\{\frac{\sin.^2 \overset{(n)}{l} - \sin.^2 \overset{(1)}{l}}{\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}}\right\}$$

where n denotes the number of degrees, and d the increment of the 1st degree. Here it is evident that d is the only unknown quantity to be determined, since $\overset{(1)}{X} + \overset{(2)}{X} + \overset{(3)}{X} \ldots \overset{(n)}{X} = A$ the meridional measure of an arc of n complete degrees, $\overset{(2)}{X}$ being the measure of the 2d degree in latitude $\overset{(1)}{l}$ by observation.

$$\text{Hence } A = n\overset{(1)}{X} + d\left\{\frac{(\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}) + \ldots (\sin.^2 \overset{(n)}{l} - \sin.^2 \overset{(1)}{l})}{(\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l})}\right\}$$

$$\text{And } d = \frac{\ldots (\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l})}{(\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l}) + (\sin.^2 \overset{(3)}{l} - \sin.^2 \overset{(1)}{l}) \ldots (\sin.^2 \overset{(n)}{l} - \sin.^2 \overset{(1)}{l})}$$

whence d becomes a known quantity; and since $(\sin.^2 \overset{(4)}{l} - \sin.^2 \overset{(1)}{l})$ is a constant and known quantity, $\frac{d}{(\sin.^2 \overset{(2)}{l} - \sin.^2 \overset{(1)}{l})}$ be denoted by $\ldots$

We shall have the order of the [illegible] degrees as follows:

$$\overset{(2)}{X} = \overset{(1)}{X} + \ldots$$

$$\overset{(3)}{X} = \overset{(2)}{X} + \ldots$$

$$\overset{(3)}{X} = \overset{(1)}{X} + \ldots (\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(2)}{l})$$

$$\overset{(4)}{X} = \overset{(1)}{X} + \ldots (\mathrm{Sin.}^2 \overset{(4)}{l} - \mathrm{Sin.}^2 \overset{(1)}{l}) \text{ \&c.}$$

$$\text{to } \overset{(n)}{X} = \overset{(1)}{X} + \ldots (\mathrm{Sin.}^2 \overset{(n)}{l} - \mathrm{Sin.}^2 \overset{(1)}{l})$$

When the degrees are decreasing from $\overset{(1)}{X}$ to latitude $\overset{(1)}{l}$, then let $\overset{(-1)}{X}$ be the next lower degree in lat. $\overset{(-1)}{l}$; $\overset{(-2)}{X}$ the next for lat. $\overset{(-2)}{l}$ &c.

$$\text{then } \frac{\overset{(1)}{X} - \overset{(-1)}{X}}{3\overset{(1)}{X}(\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-1)}{l})} = \frac{\overset{(1)}{X} - \overset{(-2)}{X}}{3\overset{(1)}{X}(\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-2)}{l})}$$

$$\text{An therefore } \overset{(-2)}{X} = \overset{(1)}{X} - (\overset{(1)}{X} - \overset{(-1)}{X}) \left\{ \frac{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-2)}{l}}{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-1)}{l}} \right\}$$

Putting $\overset{(1)}{X} - \overset{(-1)}{X} = d$ we shall have,

$$\overset{(1)}{X} = \overset{(1)}{X} - \ldots$$

$$\overset{(-1)}{X} = \overset{(1)}{X} - d$$

$$\overset{(-2)}{X} = \overset{(1)}{X} - d \left\{ \frac{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-2)}{l}}{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-1)}{l}} \right\}$$

$$\overset{(-3)}{X} = \overset{(1)}{X} - d \left\{ \frac{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-3)}{l}}{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-1)}{l}} \right\}$$

$$\overset{(4)}{X} = \overset{(1)}{X} - d \left\{ \frac{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-4)}{l}}{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-1)}{l}} \right\} \text{ \&c.}$$

$$\text{to } \overset{(-n)}{X} = \overset{(1)}{X} - d \left\{ \frac{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-n)}{l}}{\mathrm{Sin.}^2 \overset{(1)}{l} - \mathrm{Sin.}^2 \overset{(-1)}{l}} \right\} \text{ which reduced,}$$

$$\sin^2 l = \frac{\sin^2 h}{\left(\sin^2 l^{(1)} - \sin^2 l^{(2)}\right)\left(\sin^2 l^{(1)} - \sin^2 l^{(3)}\right) \&c. \ldots \left(\sin^2 l^{(1)} - \sin^2 l^{(n)}\right)}$$

where h is the terrestrial arc in fathoms, and n the number of complete degrees. Then when l is found, put $\varphi = \frac{1}{\left(\sin^2 l^{(1)} - \sin^2 l^{(2)}\right)}$ we shall have

$$\overset{(1)}{X}_1 = \overset{(1)}{X} + c$$

$$\overset{(2)}{X} = \overset{(1)}{X} - \varphi$$

$$\overset{(3)}{X} = \overset{(1)}{X} - \frac{1}{2}\left(\sin^2 l^{(1)} - \sin^2 l^{(2)}\right)\varphi$$

$$\overset{(4)}{X} = \overset{(1)}{X} - \frac{1}{3}\left(\sin^2 l^{(1)} - \sin^2 l^{(3)}\right)$$

$$\overset{(5)}{X} = \overset{(1)}{X} - \frac{1}{4}\left(\sin^2 l^{(1)} - \sin^2 l^{(4)}\right) \&c.$$

$$\overset{(n)}{X} = \overset{(1)}{X} - \frac{1}{n-1}\left(\sin^2 l^{(1)} - \sin^2 l^{(n)}\right)$$

To apply the last formula to the present measurement, it will be necessary to have a terrestrial arc to correspond with a celestial arc of one degree, and the first degree determined by observation. If we begin with the arc of great latitude page 45, which is 60172.8, fathoms of the mean arc of 60, deduced from an arc of 2° 50′ to 54′ where the corresponding terrestrial arc is the difference between *Kimmae* Rock and that at *Perpignan* is . . . . . 27150′ 75″

The half of which is the distance of the middle point of the arc from *Pulo Pellinam* = ... 83758 875″

To which add half the degree fourth, or 3 238 415

The *Perpignan* is the terrestrial arc between half the degree fourth of the middle point and *Quinapolkon* 224 790

The latitude of which commencement is 9 8 [illegible]

30 or 9 4 43.6 the latitude of the fourth extremity of an arc of complete degrees. Now the terrestrial arc between *Putchapolliam* and *Namthabad* is . . . . . 248[illegible]3.334

Between *Namthabad* and *Daumergidda* is . . . . . 178[illegible]4.700

To which add the above . . . . . 8150[illegible].290

Their sum is the terrestrial arc between 9 4 43.6 and *Daumergidda*, ... 548088.024

The latitude of *Daumergidda* by adding the arc between *Namthabad* and *Daumergidda* by 13 Stars, or (2 57 23.32) to the latitude of *Namthabad* (15 [illegible] 6.51) is . . . 18 3 23.[illegible]

The same latitude by adding the whole arc between *Pennae* and *Daumergidda* by seven corresponding Stars, (9 53 45.25) to the latitude of *Pennae* (8 [illegible]) is 18 [illegible] 23.54

Gives the mean or correct latitude of *Daumergidda*, 18 3 23.58

Hence from	18 3 23.58		
Subtract	9 4 43.60		
Difference or arc	8 58 39.92 whole measure		(*Athens*) 548088.024
To which add	1 20.08 whole measure is		1345.184
Gives the number (n) of complete degrees	9 0 0 whole measure (*A*) is		544432.908

* The latitude of *Namthabad* as given in my last paper (A. P. [illegible] of 18) was 16 [illegible] but the latitude here given is considered more correct, and is had by taking the celestial arc between *Putchapolliam* and *Namthabad* to the latitude of *Putchapolliam* (which latter is obtained by adding the arc between *Pennae* and *Putchapolliam* to the latitude of *Pennae* [illegible]).

Now the measure of the first degree or $\overset{1}{X}$ is 60172.82 fathoms and $n = 9$. Therefore $n\overset{(1)}{X} = 541553.42$, which subtracted from A or 5341338.08 gives $4799784.66 = A - n\overset{(1)}{X}$.

and $\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l} = .006014$ $\therefore$ $.006014 \times 4799784.66 = 28869.34$ equal $(A - n\overset{(1)}{X}) \cdot (\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l})$ the numerator and therefore the fraction $(\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l}) + (\text{Sin.}^2\overset{(3)}{l} - \text{Sin.}^2\overset{(2)}{l}) + (\text{Sin.}^2\overset{(4)}{l} - \text{Sin.}^2\overset{(3)}{l})$ &c. . . . $(\text{Sin.}^2\overset{(9)}{l} - \text{Sin.}^2\overset{(8)}{l})$ is $.054126$.

Hence

$$\frac{(A - n\overset{(1)}{X}) \cdot (\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l})}{(\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l}) + \ldots (\text{Sin.}^2\overset{(9)}{l} - \text{Sin.}^2\overset{(8)}{l})} = \frac{28869.34}{.054126} = 533.5 = d$$

$$\text{and} \quad \frac{d}{\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l}} = \frac{4.00225}{.006014} = 675.5 = Q$$

TABLE I.

	Degrees	Fathoms	Feet	In.
$\overset{(1)}{X} = \overset{1}{X} + Q$	60	172.62	0	34
$\overset{(2)}{X} = \overset{(1)}{X} + Q$	60	170.85	10	34
$\overset{(3)}{X} = \overset{(2)}{X} + Q\,(\text{Sin.}^2\overset{(3)}{l} - \text{Sin.}^2\overset{(1)}{l})$	60	171.34	11	34
$\overset{(4)}{X} = \overset{(3)}{X} + Q\,(\text{Sin.}^2\overset{(4)}{l} - \text{Sin.}^2\overset{(1)}{l})$	60	[illegible]	13	34
$\overset{(5)}{X} = \overset{(4)}{X} + Q\,(\text{Sin.}^2\overset{(5)}{l} - \text{Sin.}^2\overset{(1)}{l})$	60	172.50	13	34
$\overset{(6)}{X} = \overset{(5)}{X} + Q\,(\text{Sin.}^2\overset{(6)}{l} - \text{Sin.}^2\overset{(1)}{l})$	60	490.82	[illegible]	34
$\overset{(7)}{X} = \overset{(6)}{X} + Q\,(\text{Sin.}^2\overset{(7)}{l} - \text{Sin.}^2\overset{(1)}{l})$	61	502.68	[illegible]	34
$\overset{(8)}{X} = \overset{(7)}{X} + Q\,(\text{Sin.}^2\overset{(8)}{l} - \text{Sin.}^2\overset{(1)}{l})$	[illegible]	[illegible]	[illegible]	[illegible]
$\overset{(9)}{X} = \overset{(8)}{X} + Q\,(\text{Sin.}^2\overset{(9)}{l} - \text{Sin.}^2\overset{(1)}{l})$	[illegible]	[illegible]	[illegible]	42

According to this table the deg[illegible] [illegible] and the mean de[illegible] latitude [illegible] as deduced [illegible] between *Namthabua* and *Dawnergilda* is 60[illegible].78 fathoms, which exceeds the computed one only [illegible].66 fathoms. It may however be [illegible] to examine what compression will be brought out by assuming 60372.83 for $\overset{(1)}{X}$, for $\frac{\overset{(8)}{A} - \overset{(1)}{X}}{3\overset{(1)}{X}(\sin^2\overset{(2)}{l} - \sin^2\overset{(1)}{l})} = \frac{4.002275}{3 \times 60472.83 \times ,006014} = \frac{1}{208.6}$ nearly, which differs considerably from that given by the general mean.

If we suppose $\frac{1}{200}$ to be the true compression, let it be determined what the value of $\overset{(1)}{X}$ ought to be to bring it out, and by that means detect the errors of the observed degrees $\overset{(1)}{X}$, and that in [illegible] which last may be compared with $\overset{(8)}{X}$. Put $A = 54[illegible]$ [illegible] $(\sin^2\overset{(2)}{l} - \sin^2\overset{(1)}{l}) = ,006014$, $b = (\sin^2\overset{(2)}{l} - \sin^2\overset{(1)}{l}) + [illegible] (\sin^2\overset{(9)}{l} - \sin^2\overset{(7)}{l}) = ,263137$. Then since $d = \frac{(A - n\overset{(1)}{X}) \cdot a}{a} = \overset{(2)}{X} - \overset{(1)}{X}$; [illegible] $= \frac{A - n\overset{(1)}{X}}{3b\overset{(1)}{X}} = \frac{1}{[illegible]}$ from which is obtained $\overset{(1)}{X} = \frac{[illegible]}{A + [illegible]}$ [illegible] 60[illegible] whence $d = \frac{(A - n\overset{(1)}{X}) \cdot ,006014}{,263137} = 3.58011$, and $Q = \frac{A}{,006014}$ $= 596.79$. From these, the following table has been computed, from which it appears that the *first* degree by measurement [illegible] fathoms in defect, and *that* in latitude [illegible] 42 is 5.59 fathoms in excess; both quantities too small to affect the elliptic hypothesis; the greatest [illegible] less than [illegible] second on the earth's surface.

TABLE II.

	Degrees in Fathoms.	Latitude.
$\overset{(1)}{X} = \overset{(1)}{X} + o$	60471.13	9° 34′ 44″
$\overset{(2)}{X} = \overset{(1)}{X} + d$	60478.73	10 34 44
$\overset{(3)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(3)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60482.65	11 34 44
$\overset{(4)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(4)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60486.91	12 34 44
$\overset{(5)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(5)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60491.5	13 34 44
$\overset{(6)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(6)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60496.42	14 34 44
$\overset{(7)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(7)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60501.65	15 34 44
$\overset{(8)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(8)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60507.19	16 34 44
$\overset{(9)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(9)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60513.04	17 34 44
	544433.21 = A	

From inspecting these two tables, it appears that the degree in latitude 13. 34. 44 is very nearly the same in each: the mean being 60491.4 fathoms, which certainly must be near the truth. We shall therefore adopt it in future with the compression $\frac{1}{304}$ for computing the general tables of degrees for every latitude from the Equator to the pole.

17. If the method be adopted which is pointed out in the 42d No. of the *Edinburgh Review*, where we may call $\overset{(1)}{X}$, $\overset{(2)}{X}$, $\overset{(3)}{X}$, &c. . . . . $\overset{(n)}{X}$, the degrees for latitudes L. $L+1$, $L+2$, $L+3$, &c. . . . . $L+(n-1)$. Now as the increment to each succeeding degree will always be *as* the sine of twice the latitude; or if m be any multiple of the sine of twice the latitude, to be determined by certain data, the increment

to each successive degree will be n. Sin. 2 latitude of the middle point of that degree, is that

$$\overset{(2)}{X} = \overset{(1)}{X} + [illegible] \text{ to } (L + o)$$

$$\overset{(2)}{X} = \overset{(1)}{X} + [illegible] \text{ Sin. } 2\,(L + o)$$

$$\overset{(3)}{X} = \overset{(1)}{X} + o + [illegible] \text{ Sin. } 2\,(L + \overset{\circ}{o}) \quad m \text{ . Sin. } 2\,(L + \overset{\circ}{1})$$

$$\overset{(4)}{X} = \overset{(1)}{X} + o + [illegible] \text{ Sin. } 2\,(L + \overset{\circ}{o}) - m \text{ . Sin. } 2\,(L + \overset{\circ}{1}) \quad m \text{ . Sin. } 2\,(L + \overset{\circ}{2})$$

That is $\overset{(1)}{X} = \overset{(1)}{X} + o$ for Ist. $(L + \overset{\circ}{o})$

$$\overset{(2)}{X} = \overset{(1)}{X} + m\,(\text{Sin. } 2\,(L + \overset{\circ}{o})$$

$$\overset{(3)}{X} = \overset{(1)}{X} + m \begin{Bmatrix} \text{Sin. } 2\,(L + \overset{\circ}{o}) \\ \text{Sin. } 2\,(L + \overset{\circ}{1}) \end{Bmatrix}$$

$$\overset{(4)}{X} = \overset{(1)}{X} + m \begin{Bmatrix} \text{Sin. } 2\,(L + \overset{\circ}{o}) \\ \text{Sin. } 2\,(L + \overset{\circ}{1}) \\ \text{Sin. } 2\,(L + \overset{\circ}{2}) \end{Bmatrix} \text{\&c.}$$

$$\overset{(n)}{X} = \overset{(1)}{X} + m \begin{Bmatrix} \text{Sin. } 2\,(L + \overset{\circ}{o}) \\ \text{Sin. } 2\,(L + \overset{\circ}{1}) \\ \text{Sin. } 2\,(L + \overset{\circ}{2}) \text{ \&c.} \\ \text{to Sin. } 2\,(L + (n - \overset{\circ}{2})) \end{Bmatrix}$$

Put $\overset{(1)}{X} + \overset{(2)}{X} + \overset{(3)}{X} + \overset{(4)}{X} \ldots\ldots \overset{(n)}{X} = A$

Then $A = n\overset{(1)}{X} + m \left\{ \overline{n - 1} \text{ . Sin. } 2\,(L + \overset{\circ}{o}) + \overline{n - 2} \text{ . Sin. } 2\,(L + \overset{\circ}{1}) \right.$

$\left. + \overline{n - 3} \text{ . Sin. } 2\,(L + \overset{\circ}{2}) + \overline{n - 4} \text{ . Sin. } 2\,(L + \overset{\circ}{3}) \text{ \&c} \right\}$

$$\text{And } m = \frac{A - n\overset{(1)}{X}}{\overline{n - 1} \text{ . Sin. } 2\,(L + \overset{\circ}{o}) + \overline{n - 2} \text{ . Sin. } 2\,(L + \overset{\circ}{1}) \times \overline{n - 3} \text{ . Sin. } 2\,(L + \overset{\circ}{3}) \text{ \&c.}}$$

Now m being determined, it will be easy to compute the successive degrees, from the above arrangement it appears that

$\overset{(1)}{X} = \overset{(1)}{X} + o$

$\overset{(2)}{X} = \overset{(1)}{X} + m \,.\, \text{Sin. } 2\,(L + \overset{\circ}{0})$

$\overset{(3)}{X} = \overset{(2)}{X} + m \,.\, \text{Sin. } 2\,(L + \overset{\circ}{1})$

$\overset{(4)}{X} = \overset{(3)}{X} + m \,.\, \text{Sin. } 2\,(L + \overset{\circ}{2})$

$\overset{(5)}{X} = \overset{(4)}{X} + m \,.\, \text{Sin. } 2\,(L + \overset{\circ}{3})$ &c.

to $\overset{(n)}{X} = \overset{(n-1)}{X} + m \,.\, \text{Sin. } 2\,(L + \overset{\circ}{(n-2)})$

Then in order to get the value of m; Let $A = 544433.71$, $n = 9$; $L = 9^\circ\ 34'\ 44''$; $\overset{(1)}{X} = 60472.83$. — Then $A - 9\,\overset{(1)}{X} = 177\ 74$ the numerator.

But $\overline{n - 1}$ Sin. $2\,(L + \overset{\circ}{0}) = 8$. Sin. $(19^\circ\ 9'\ 28'')$	2.6253648
$\overline{n - 2}$ Sin. $2\,(L + 1) = 7$. Sin. $(21^\circ\ 9'\ 28'')$	2.5265618
$\overline{n - 3}$ Sin. $2\,(L + 2) = 6$. Sin. $(23^\circ\ 9'\ 28'')$	2.3595870
$\overline{n - 4}$ Sin. $2\,(L + 3) = 5$. Sin. $(25^\circ\ 9'\ 28'')$	2.1255625
$\overline{n - 5}$ Sin. $2\,(L + 4) = 4$. Sin. $(27^\circ\ 9'\ 28'')$	1.8257696
$\overline{n - 6}$ Sin. $2\,(L + 5) = 3$. Sin. $(29^\circ\ 9'\ 28'')$	1.4616489
$\overline{n - 7}$ Sin. $2\,(L + 6) = 2$. Sin. $(31^\circ\ 9'\ 28'')$	1.0347932
$\overline{n - 8}$ Sin. $2\,(L + 7) = 1$. Sin. $(33^\circ\ 9'\ 28'')$	0.5469465
Sum —	14.5062343

Hence $\dfrac{177.74}{14.5062343} = 12.2527 = m$.

Hence if the aforesaid value of m be substituted in the above, and multiplied by the fines of $19^\circ\ 9'\ 28''$; $21^\circ\ 9'\ 28''$; $23^\circ\ 9'\ 28''$, &c. respectively, we shall have the degrees as follows:—

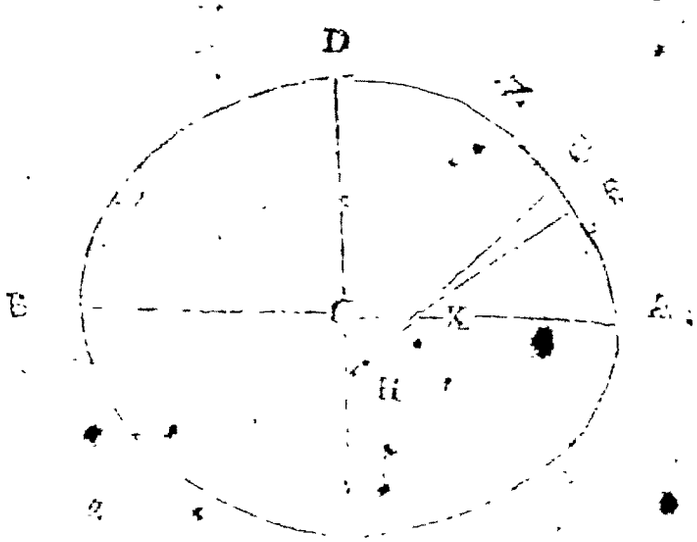
$\overset{(1)}{X} = 60472.83$ fathoms, for Latitude	$9^\circ\ 34'\ 44''$
$\overset{(2)}{X} = 60476.85$	$10^\circ\ 34'\ 44''$

(3) X = [illegible] ..... [illegible]
(4) X = [illegible] ..... [illegible]
(5) X = [illegible] ..... [illegible]
(6) X = [illegible] 14 34 41
(7) X = [illegible] ..... [illegible]
(8) X = [illegible] ..... [illegible]
(9) X = [illegible] ..... [illegible]

These results are the same very nearly as in the above table 1st, and m, Sin. (19° 9′ 23″,) is the same as in the former case.

18. With respect to the compression, that nothing may be left undone to give full and entire satisfaction on that subject, I shall here add an investigation similar to that given by Professor *Playfair* in the 5th Vol. of the *Edinburgh Philosophical Transactions*, where in place of using the measures of single degrees due to particular latitudes, the measured arcs of large amplitudes are made use of, the extremes of whose extremities are determined with great accuracy.

Let A, D, L, E, be a meridian of the earth, where A is at the equator, and D at the pole. Suppose F to be any point on that meridian, and $F H$ the radius of curvature of the ellipse at that point. Put $A C = a$, $D C = b$, C being the center of the ellipse; and let A be equal to the angle $A K F$, the latitude of F, or let it be the *measure* of the arc of latitude to rad. 1; that is, the *measure* of the angle $A K F$ in parts of the rad. 1. — If $G F$ be an indefi-



nitely small part of the ellipse; then if $AF = z$, $GF = z$ the fluxion of the arc AF. And of GH be drawn, then the angle $GHF = A$ the fluxion of the arc of latitude to rad. 1. Hence as $1 : A :: FH : z = A + FH$. But the radius of curvature $FH = a^2 b^2 (a^2 - a^2 . \text{Sin.}^2 A + b^2 . \text{Sin.}^2 A)^{-\frac{1}{2}}$ Then if $c = a - b$ we have $b = a - c$, and $b^2 = a^2 - 2ac + c^2 = a^2 - 2ac$ nearly since c is very small compared with a or b. Hence $FH = a^3 (a - 3c) . (a^2 - 2ac . \text{Sin.}^2 A)^{-\frac{1}{2}}$. But $(a^2 - 2ac . \text{Sin.}^2 A)^{-\frac{1}{2}}$ expanded is equal to $a^{-3} (1 + \frac{3c}{a} . \text{Sin.}^2 A)$ nearly, by rejecting all the terms involving c^2 and therefore $FH = a - 2c + 3c . \text{Sin.}^2 A$, which substituted for FH, we get $z = A (a - 2c + 3c . \text{Sin.}^2 A) = A (a - 2c) + A (3c . \text{Sin.}^2 A.)$ But $\text{Sin.}^2 A = \frac{1 - \text{Cos.} 2A}{2}$ and therefore $z = A (a - 2c) + \frac{3}{2} . cA - \frac{3}{4} . cA . \text{Cos.} 2A$ whose fluent is $z = (a - \frac{3}{2}c) A - \frac{3}{4}c . \text{Sin.} 2A = aA - c (\frac{A}{2} + \frac{3}{4} A . \text{Sin.} 2A)$ which requires no correction; and this is the measure of an arc on the meridian extending from the equator to the latitude of the point F, where A denotes the arc of latitude in parts of the rad. 1.

Let N be any other point whose arc of latitude is A'. Then $AN = aA' - c \left\{ \frac{A'}{2} + \frac{3}{4} A' . \text{Sin.} 2A' \right\}$ and hence we get $FN = a (A' - A) - c \left\{ \frac{A' - A}{2} + \frac{3}{4} \text{Sin.} 2A' - \frac{3}{4} \text{Sin.} 2A \right\}$. Put $A' - A = m$, $\frac{A' - A}{2} + \frac{3}{4} \text{Sin.} 2A' - \frac{3}{4} . \text{Sin.} 2A = n$, and L the length of the measured arc in fathoms;

then $L = ma - na$. Now if any other arc be measured whose length is in fathoms L and whose extremities are in latitudes A and A', and if $x = A - A'$, also $n = \frac{\ldots}{\ldots} \sin^2 A - \frac{2}{3} \cdot \sin. 2 \ldots$, then $L = ma - na$, from which two equations we get $t = \frac{\ldots}{\ldots}$ and $c = \frac{\ldots}{\ldots}$ the compression.

To apply this to the case in question,

Let A be the latitude of Dunnose	8° 9′ 38.4″
A' be that of *Dunnargiddal*	18° 3′ 43.6″
$x = A - A'$ equal	9° 53′ 45.2″ = 1.27165
A'' the latitude of *Dunkirk*	2° 5′
A''' that of *Barcelona*	41° 23.8′
$x = A'' - A'''$ equal	9° 46′ 23.8″ = 1.166
$n = \frac{x^2}{4} \cdot \frac{1}{3} \cdot \sin^2 A - \frac{1}{3} \cdot \sin. 2A$ equal	[illegible]
$n = \frac{x^2}{2} \cdot \frac{1}{3} \cdot \sin^2 A - \frac{1}{3} \cdot \sin. 2A$ equal	[illegible]

$L = 59861$ fathoms the arc of France and *Dunkirk*.
$L = 587,987$ fathoms between *Dunnargiddal* and *Barcelona*.

Then $\frac{L - mb}{L - na} = \ldots$ nearly, which differs considerably from the

brought out by the general [illegible]. However as I am not at present in [illegible] of the account of the Swedish measurement, nor of that of the English since the operations have been extended to the northward of Lincoln, I shall not depend on this single comparison, but abide by the compression $\frac{1}{304}$ which for reasons already given, cannot be far from the truth.

11. Since there is determined to allow $\frac{1}{304}$ for the compression, and 60291 $\frac{1}{4}$ fathoms for the measure of the degree due to latitude 13° 33′ [illegible] have $\frac{1}{304} = 0.0032896$. [illegible] fraction $\frac{\quad}{304}$ will give $1 + e = 1.0032896$. Then let d [illegible] 57° 2957795, the arc equal to radius, and a = semiaxis of the equator; we have $\frac{a}{1+e} = \frac{a(\cos.^2 d + (1+e)^2 \sin.^2 d)}{1+e} = 3486852.4$ fathoms, for the measure of the equatorial circle, which divided by 57° 2957795 gives 60291.5 fathoms for the degree on the equator, which will be of use for computing both the degrees perpendicular to the meridian, and the degrees of longitude. Then supposing the ratio of the two diameters is as 1 : 1.0032896, we shall have the semi-conjugate axis $= \frac{3486852.4}{1.0032896} = 3476491.110$ fathoms. Since n is the degree for latitude l, let m be the degree for any other latitude l', given by the formula in art. 2. After which [illegible] we have $m = \frac{m(\cos.^2 l' + (1+e) + \sin.^2 l')}{\cos.^2 l + (1+e)^2 + \sin.^2 l}$ [illegible] $\cos.^2 l$ $= 1$, and $\sin. l = 0$, [illegible] $\frac{\cos.^2 l' (1+e) + \sin.^2 l'}{\quad}$ [illegible] If 60291.4 be substituted for m [illegible] $n =$

$$60491.4\left(\frac{\text{Cos.}^2\ 13\ 34\ 5 + (1.0028926)^2 \times \text{Sin.}^2\ 13\ 34\ 41}{(1.0028926)^3}\right) = 60458.64$$ for the de-

gree on the meridian whose middle point is on the equator.—*Bouguer's* degree measured under the equator in *South America* was 60482 fathoms, which exceeds this by upwards of 23 fathoms. It is *Bouguer's* measurement which the *French* Mathematicians have used with that of *De Lambre*, and they have made the compression to be $\frac{1}{334}$.

For the length of the quadrantal arc of the elliptic meridian, since a is the longer diameter, $a \times 3.14159$ &c. will be the length of the circumscribing arcle, or the circle whose diameter is 6973905 fathoms, and circumference equal 6973905×3.14 &c. $= 21908830$ fathoms. But $d = \frac{1}{334} = .00656$ nearly.

THEN $a \times 1 + \frac{d^2}{2} + \frac{3d^4}{2^2 \cdot 4^2}$ &c. $= a \times 3.141$ &c. $= a \times 3.14159$ &c. $\times \left(1 - \frac{d}{2} - \frac{3d^2}{2^2 \cdot 4^2}\right.$ &c.$\left.\right) = 21908830 \times .998358$ equal 21874656 fathoms, the whole circumference of the elliptic meridian, whose transverse axis is the length a of the equatorial diameter, or 6973905 fathoms, and whose conjugate axis is b, equal 6950839 fathoms, the length of the polar axis. Hence $\frac{21874656}{4} = 5468616$, fathoms, the length of the quadrantal arc; which reduced to inches and divided by 10,000,000 will give 39,3708 *English* inches for the length of the *French* metre at the temperature of 62°. But the French standard is at the temperature of 32°, at which the metre by their measurement was 39,3696 *English* inches, which according to the rate of expansion in brass of which the standards

[illegible] made, would, at the temperature of [illegible] be [illegible] 39,371 English inches, which differs from the above, only [illegible] inches, a difference altogether inestimable. The metre, as it is defined by the [illegible] is the unit of measure, and is adopted as such by most of the nations on this continent. The *English*, as a great commercial people, have never yet been able to fix upon a standard, though they have for ages experienced the want of it, and their aversion to receiving anything that is foreign, as a guide, has left them to this day without any standard in nature to which they can refer. Here cannot, in my opinion, be any thing more simple, than to take some fractional part of a quadrant of the earth's meridian, whose length has been so unquestionably settled, and a fixed standard measure, call it what they please, could always be referred to the brass standard scale; and if at the temperature of 62°, the measure of 39,371 inches be taken off, we know *that* to be exactly the ten millionth part of a quadrant of the meridian, which must be for ever invariable.

The unit of measure being once determined upon, it's multiples and sub-multiples may be arranged according to any system best adapted to the habitual mode of counting. The *French Philosophers* have chosen the *decimal* system altogether. The multiples, which are named from the *Greek* numerals, are the *decametre* equal to *ten* metres; the *hecto-metre*, equal to *ten* decametres; the *kilometre*, equal to *ten* hectometres, *&c.* The sub-multiples are from the *Latin* numerals, where the *decimetre* is equal to $\frac{1}{10}$ of the metre; the *centimetre* equal to $\frac{1}{10}$ of the decimetre, and the *millimetre* equal to $\frac{1}{10}$ of the centimetre, *&c.*

For the unit of measure for *capacity*, the decimetre is used, and

called the *grave*, and is equal to a [illegible] block, with measures [illegible] of measure for weight, [illegible] the weight of a cubic [illegible] of distilled water, at the temperature of [illegible].

This system is extremely simple and ingenious, and promises perpetuity, whenever the old prejudice in favor of the ancient weights and measures shall be overcome; and notwithstanding its foreign origin, I think I will hope that an enlightened nation like ours, will [illegible] this, or [illegible], on similar principles. New names seem to be absolutely necessary, and I do not know of any that are more appropriate, than those which the *French* mathematicians have made use of. We have no measure which corresponds with any fractional part of a quadrant of a degree of the meridian. The fathom may be considered, but it certainly is not so simple a fraction as the 10,000,000th part, and if we were to increase the yard to correspond with the metre, we should have to increase the inch, the foot, and every other measure in the same proportion. Superficial and cubic measures would be also to undergo the same changes. A system, which has already been adopted by nearly all the nations on the continent, would the more easily become universal.

[illegible]

[illegible] elevations of Depressions in [illegible] Area, [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] municipal [illegible]

Stations	[illegible]	Difference of the Stations and Depressions	Correction [illegible]	Reference [illegible]	Stations	Elevation
Gudlaoi	[illegible]	0 [illegible] 17 E	17 [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	G[illegible]	[illegible] 15 30 D				
[illegible]	Adondroog	0 8 49 D	15 16	[illegible]	Adondroog	2108
[illegible]	[illegible]	0 1 47 D				
Adondroog	Mulliabad	0 17 2 D	29 40	[illegible]	Mulliabad	1[illegible]
Mulliabad	Adondroog	0 6 56 D				
Mulliabad	Kotapilly	0 12 22 D	20 10	[illegible]	Kotapilly	10[illegible]
Kotapilly	Mulliabad	0 2 6 D				
Mulliabad	Durroor	0 13 52 D	18 34	[illegible]	Durroor hill	1832
Durroor hill	Mulliabad	0 8 16 D				
Durroor hill	Inpalgutt	0 0 55 D	28 57	[illegible]	Inpalgutt	2400
Inpalgutt	Durroor hill	0 21 33 D				
Kotakondah	Poolyoondah	0 12 36 D	2 56	[illegible]	Poolyoondah	139[illegible]
Poolyoondah	Kotakodangul	0 6 38 E				
Poolyoondah	Kotakodangul	0 18 42 D	21 [illegible]	[illegible]	Kotako Belangul	1495
Kotakodangul	Poolyoondah	0 2 24 E				
Kotarbily	Kandakoor	0 4 12 E	19 19	[illegible]	Kandakoor	[illegible]
Kandakoor	Kotapilly	0 17 50 D				
Inpalgutt	Kotakodangul	0 19 [illegible] D	25 24	[illegible]	Kotakodangul	[illegible]
Kotakodangul	Inpalgutt	0 0 37 E				
Kotakodangul	[illegible]	0 [illegible] 0	2 52	[illegible]	Kunakoorice	9[illegible]
Kunakoorice	Kunakoorice	0 14 39				
Kunakoorice	Kotakodangul	0 20 35 D	[illegible]	[illegible]	Kotakodangul	1691
Kotakodangul	Kunakoorice	0 8 21 E				
Kotakodangul	Pochanabgutt	0 5 33 E	[illegible]	[illegible]	Pochanabgutt	2410
Pochanabgutt	Kotakodangul	0 10 10 D				
Kotakodangul	Pargy hill	0 9 15 E	[illegible]	[illegible]	Pargy hill	2460
Pargy hill	Kotakodangul	0 23 23 D				
Kotakodangul	Kotamarpilly	0 4 26 D	24 [illegible]	[illegible]	Kotamarpilly	2258
Kotamarpilly	Kotakodangul	0 18 9 D				
Kotamarpilly	Topecondah	0 7 58 D	13 30	[illegible]	Topecondah	3255
Topecondah	Kotamarpilly	0 6 35 [illegible]				
Kotamarpilly	Goragutt	0 12 19 D	[illegible]	[illegible]	Goragutt	2167
Goragutt	Kotamarpilly	0 5 11 E				
Goragutt	Dondillah	0 [illegible] 23 D	10 [illegible]	[illegible]	Dondillah	200[illegible]
Dondillah	Goragutt	0 2 6 [illegible]				
Goragutt	Sheelapilly	0 10 27 E	11 1[illegible]	[illegible]	Sheelapilly	2973
Sheelapilly	Goragutt	0 21 [illegible]				
Goragutt	Tandmunnoor	0 16 12 D	11 [illegible]	[illegible]	Tandmunnoor	1918
Tandmunnoor	Goragutt	0 6 36 [illegible]				
Dondillah	Dummergidda	0 5 [illegible] D	10 5	[illegible]	Dummergidda	20[illegible]8
Dummergidda	Dondillah	0 0 39 D				
Kotakodangul	Anuntagherry	0 6 44 E	16 18	[illegible]	Anuntagherry	2398
Anuntagherry	Kotakodangul	0 21 24 D				
Topecondah	Tandmunnoor	0 8 57 D	3 4[illegible]	[illegible]	Tandmunnoor	1[illegible]
Tandmunnoor	Topecondah	0 1 27 E				
Tandmunnoor	Dondillah	0 0 [illegible] E				
Dondillah	Tandmunnoor	0 8 42 D	9 2	[illegible]	[illegible]	200
Sheelapilly	Malliga hill	0 2 [illegible]				
Malliga hill	Sheelapilly hill	0 4 17 [illegible]	7 44	[illegible]	[illegible] hill	28[illegible]2
Malliga hill	West end of the base	0 24 [illegible] D				
[illegible] the Base	Malliga hill	0 15 [illegible] E	30 14	[illegible]	[illegible] of the Base	1956
[illegible]	West end of the base	0 10 28 D				
West end of the Base	[illegible]	0 2 12 E	6 43	[illegible]	[illegible] of the Base	1928
West end of the Base	West end of the [illegible]	0 [illegible] E				
East end of the Base	West end of the [illegible]	0 3 [illegible] D	[illegible]	[illegible]	East end of the Base	1983

[illegible] THE DIMENSIONS OF AN ARC

[illegible] Tables of Degrees of Latitude, Longitude, [illegible] and Longitude, from the equator to the Pole

MERIDIONAL DEGREES.

Latitudes.	Degrees.	Latitudes.	Degrees.	Latitudes.	Degrees.
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
0	60458.61	31	60815.5	61	[illegible]
1	60466.8	32	60827.8	62	[illegible]
2	60489.2	33	60835.2	63	60941.6
3	60520.2	34	60844.8	64	60959.6
4	60561.3	35	60855.5	65	60967.4
5	60613.9	36	60864.6	66	60965.3
6	60668.1	37	60871.3	67	60972.7
7	60757.5	38	60884.4	68	60976.5
8	60870.1	39	60891.0	69	[illegible]
9	60973.9	40	60904.8	70	60995.4
10	60975.3	41	60918.1	71	60990.7
11	60180.3	42	60923.4	72	[illegible]
12	60484.3	43	60935.8	73	[illegible]
13	60188.7	44	60941.2	74	[illegible]
14	60495.1	45	60944.7	75	[illegible]
15	[illegible]	46	60945	76	[illegible]
16	60503.6	47	60[illegible]	77	61096.7
17	60509.8	48	60988.0	78	[illegible]
18	60515.4	49	60995.1	79	61035.4
19	60521.6	50	60998.5	80	61043.5
20	[illegible]	51	[illegible]	81	61047.6
21	[illegible]	52	[illegible]	82	61048.3
22	[illegible]	53	[illegible]	83	61050.7
23	60549.4	54	[illegible]	84	61052.7
24	60557.0	55	[illegible]	85	61054.8
25	60564.0	56	60669.0	86	[illegible]
26	60573.9	57	60676.7	87	61056.6
27	60581.2	58	60688.5	88	61057.1
28	[illegible]	59	60892.6	89	61057.5
29	[illegible]	60	60898.7		
30	60597.4	61	60913.7		

PERPENDICULAR DEGREES.

Latitudes.	Degrees.	Latitudes.	Degrees.	Latitudes.	Degrees.
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
0	60852.05	10	60863.0	20	60880.4
1	60853	11	60864.3	21	60883.7
2	60854.5	12	60865.7	22	[illegible]
3	[illegible]	13	60867.1	23	[illegible]
4	[illegible]	14	60868.7	24	[illegible]
5	60858.6	15	60870.4	25	[illegible]
6	60860.9	16	60872.2	26	[illegible]
7	[illegible]	17	60874.1	27	[illegible]
8	60860.6	18	[illegible]	28	[illegible]
9	60861.9	19	[illegible]	29	[illegible]

ON THE MERIDIAN.

PERPENDICULAR DEGREES.—*Continued.*

Latitudes.	Degrees.	Latitudes.	Degrees.	Latitudes.	Degrees.
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
30	60936.6	[illegible]	[illegible]	72	[illegible]
31	60910.0	62	[illegible]	73	[illegible]
32	[illegible]	63	[illegible]	76	[illegible]
33	[illegible]	65	[illegible]	77	[illegible]
34	60919.4	[illegible]	[illegible]	78	61048.3
35	60933.7	[illegible]	[illegible]	79	61042.9
36	60936.0	58	[illegible]	80	61041.2
37	60929.3	60	[illegible]	81	61042.3
38	[illegible]	61	[illegible]	82	61045.4
39	[illegible]	61	[illegible]	83	61044.3
40	60939.3	62	[illegible]	84	61046.1
41	[illegible]	63	61015.8	85	61046.7
42	[illegible]	64	61018.6	86	61056.3
43	60949.9	65	[illegible]	87	61056.7
44	[illegible]	66	61024.0	88	61067.0
45	[illegible]	67	[illegible]	89	61067.2
46	60960.2	68	61029.0	90	61067.26
47	60963.9	69	[illegible]		
48	60967.4	70	[illegible]		
49	60970.8	71	[illegible]		
50	60974.3	72	61039.0		
51	60977.7	73	61040.1		

LONGITUDINAL DEGREES.

Latitudes	Degrees.	Latitudes.	Degrees.	Latitudes.	Degrees.
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
0	60657.06	31	54210.0	62	28043.6
1	60847.6	32	51657.9	63	[illegible]
2	60820.2	33	51088.5	64	26748.8
3	[illegible]	34	50504.8	65	[illegible]
4	[illegible]	35	49904.6	66	[illegible]
5	[illegible]	36	49290.9	67	[illegible]
6	[illegible]	37	48660.2	68	[illegible]
7	[illegible]	38	48015.6	69	[illegible]
8	[illegible]	39	47358.2	70	[illegible]
9	[illegible]	40	46687.2	71	19671.4
10	[illegible]	41	[illegible]	72	18831.6
11	[illegible]	42	[illegible]	73	17846.3
12	[illegible]	43	44876.0	74	[illegible]
13	[illegible]	44	43840.2	75	[illegible]
14	[illegible]	45	[illegible]	76	14763.9
15	[illegible]	46	41266.6	77	[illegible]
16	[illegible]	47	40177.3	78	12682.7
17	43911.2	48	40106.1	79	[illegible]
18	42898.6	49	40000.6	80	[illegible]
19	[illegible]	50	39198.6	81	[illegible]
20	37208.8	51	[illegible]	82	[illegible]
21	36839.9	52	37510.7	83	7740.6
22	36451.6	53	36701.4	84	6382.0
23	36047.2	54	35847.9	85	5321.4
24	35625.8	55	34933.1	86	[illegible]
25	35187.8	56	34007.6	87	[illegible]
26	[illegible]	57	[illegible]	88	[illegible]
27	34290.5	58	[illegible]	89	1063.2
28	[illegible]		31919.4	90	
29	33567.8	59	30201.5		
30	[illegible]	60	[illegible]		

MEASUREMENT OF AN ARC

The foregoing Tables of Degrees are computed from the form given in [illegible] 6th and 8th. of the Appendix to page [illegible] Vol. [illegible] Philosophical Researches, where

m = The degree in latitude } On the Equator where $p = d$
p = The perpendicular degree
d = The degree of longitude

$\overset{1}{m}$ = The degree on the meridian } In any other latitude
$\overset{1}{p}$ = The perpendicular degree
$\overset{1}{d}$ = The degree of longitude
1 = The polar axis
$1 + e$ = The equatorial diameter

$$\text{Then } \overset{1}{m} = m - \frac{\sqrt{\cos^2 \phi \cdot (1+e)^2 + \sin^2 \phi}}{\sqrt{\cos^2 \phi \cdot (1+e)^4 + \sin^2 \phi}}$$

$$\overset{1}{p} = \frac{p(1+e)}{\sqrt{\cos^2 \phi \cdot (1+e)^2 + \sin^2 \phi}}$$

$$\overset{1}{d} = \frac{d(1+e)}{\sqrt{(1+e)^2 + \tan^2 \phi}}$$

In which (See Art. [illegible]) $m = 6049^{t}\ 4[illegible] = 13\ 34\ [illegible]$
p or $d = 6085\ 7.05$ fath. and $1 + e = [illegible]$

22. Latitudes and Longitudes of all the great stations, and principal places deduced from the Meridional Arc, including those formerly given; the whole being computed from the scale of degrees given in Art. 21.

NAMES OF PLACES.	Countries and Provinces	Latitudes.	Longitudes from Madras observ.	Longitudes from Greenwich
		° ′ ″	° ′ ″	° ′ ″
Pallam, Christian Church	Travancore.	8 5 17	2 49 0 W	77 29 30 E
Munnacaud, Christian Church	Travancore.	8 5 20	2 46 11	77 32 19
Kadulaputnam.	Travancore.	8 8 [illegible]	2 56 5	77 22 25
Kootapooli, Christian Church	Tinnivelly.	8 8 53	2 39 8	77 39 22
Shevandram, pagoda	Travancore.	8 9 23	2 47 14	77 31 16
Punna,	Tinnivelly.	8 9 38	2 37 39	77 40 51
Pillikolum, Christian Church	Tinnivelly.	8 9 44	2 25 37	77 42 53
Kotar, Christian Church	Travancore.	8 10 34	2 48 52	77 29 38
Koodankolum,	Tinnivelly.	8 10 36	2 34 31	77 43 59
Koolachy, Christian Church	Travancore	8 10 43	2 0 45	77 17 45
Naugarcoil, Barrack gate	Travancore.	8 11 14	2 49 22	77 29 8
Oodagherry, Flag Staff	Travancore.	8 14 37	2 54 51	77 23 59
Arembully, hill and pagoda	Travancore.	8 15 2	2 44 22	77 34 8
Munpotha,	Tinnivelly.	8 16 2	2 40 36	77 37 54
Oodagherry hill,	Travancore.	8 16 11	2 55 57	77 24 33
Aunaepaurai,	Travancore.	8 16 53	2 0 35	77 17 58
Red hills,	Tinnivelly.	8 22 40	2 22 52	77 55 38
Commorin Peak,	Tinnivelly.	8 23 40	2 43 53	77 34 37
Mundagherry,	Travancore.	8 23 10	2 45 50	77 32 40
Rajakamangum hill, (mark)	Tinnivelly.	8 26 7	2 35 16	77 43 14
Trivandaram, pagoda	Travancore.	8 29 3	3 18 31	76 59 59
Nagalacherry, pagoda	Tinnivelly.	8 29 35	2 35 42	77 42 48
Tirchendoor, pagoda	Tinnivelly.	8 29 51	2 7 27	78 11 3
Kunnimapotha,	Tinnivelly.	8 30 29	2 37 49	77 40 41
Kalcaud Fort, pagoda	Tinnivelly.	8 31 8	2 42 7	77 36 23
Perrandapotha, mark	Tinnivelly.	8 31 25	2 39 3	77 39 27
Sri vaigundum pagoda	Tinnivelly.	8 37 58	2 20 33	77 57 57
Coomatoor hill	Tinnivelly.	8 41 53	2 34 48	77 43 42
Vallaoud hill	Tinnivelly.	8 42 16	2 22 5	77 56 25
Pallamcottah, Flag Staff	Tinnivelly.	8 43 32	2 30 37	77 47 33
Tinnivelly, pagoda	Tinnivelly.	8 43 47	2 33 51	77 44 39
Mullipottam hill, pagoda	Tinnivelly.	8 45 33	2 28 53	77 49 37
East of the base,	Tinnivelly.	8 46 22	2 31 33	77 46 57
West end of the base,	Tinnivelly.	8 47 7	2 36 31	77 41 36
Tutacorin, Flag Staff	Tinnivelly.	8 48 2	2 16 13	78 2 17
Vullankota hill	Tinnivelly.	8 48 25	2 37 46	77 40 44
Tamboatpotha,	Tinnivelly.	8 49 [illegible]	2 31 47	77 46 43
Woiapuddanam, pagoda	Tinnivelly.	8 54 37	2 13 54	78 4 36
Kolanelloor hill,	Tinnivelly.	8 55 40	2 16 17	78 2 13
Panjalamcoorchy, (gateway)	Tinnivelly.	8 56 4	3 2 14	77 16 16
Vypaur, Christian Church	Tinnivelly.	9 0 47	1 58 47	78 19 43
Vypaur station	Tinnivelly.	9 1 32	2 0 19	78 18 11
Vambaur, Christian Church	Tinnivelly.	9 5 0	1 53 24	78 25 8
Marripoor, building	Tinnivelly.	9 6 58	1 50 7	78 28 23
Mookoor, Christian Church	Tinnivelly.	9 7 54	1 46 24	78 32 6
Yettanooram, palace	Tinnivelly.	9 8 59	2 15 20	78 3 10
Shangaranaeoli, pagoda	Tinnivelly.	9 10 19	2 43 12	77 35 18
Perrloormalli,	Tinnivelly.	9 12 23	2 45 28	77 33 2
Meenachipooram,	Tinnivelly.	9 12 40	2 16 25	78 2 5
Chungoo Choultry,	Ramnad.	9 14 49	1 24 32	78 53 58
Perjapatam,	Ramnad.	9 15 7	1 20 39	78 57 51
Ramaswamy Choultry,	Ramnad.	9 15 54	1 11 31	79 6 59
Moothoopeit, Christian Church	Ramnad.	9 14 14	1 19 58	78 58 32
Valdaur,	Ramnad.	9 16 30	1 8 38	79 9 52

NAMES OF PLACES.	Countries and Provinces.	Latitudes.			Longitudes from Madras observ.			Longitudes from Greenwich.		
					°	′	″	°	′	″
* Womoolour Fort, smaller	Coimbatoor	11	44	10	2	12	61 W.	78	5	30 E.
* Porur small,	Coimbatoor.	12	8	50	2	33	27	77	42	3
* Dharapully droog,	Coimbatoor.	12	12	18	2	54	59	77	24	31
Gopaldroog,	Mysoor.	12	29	26	2	57	29	77	21	1
* Deoraberg,	Mysoor.	12	37	35	2	37	35	77	40	65
Moodewaddie droog,	Mysoor.	12	41	0	2	48	36	77	28	54
Ancient Fort, pagoda	Mysoor.	12	42	27	2	33	31	77	44	59
Oosoor hill, pagoda	Mysoor.	12	45	37	2	34	53	77	53	37
Bonnulgotteh hill,	Mysoor.	12	48	38	2	40	40	77	37	50
Timmaroyeh N. E. ∠ of Fort,	Mysoor.	12	50	31	2	37	28	77	41	2
* Bangalore palace	Mysoor.	12	57	27	2	40	24	77	37	46
* Dodagoosah,	Mysoor.	13	0	4	2	37	40	77	40	50
* Mugnapum,	Mysoor.	13	0	18	2	40	13	77	38	17
* Tertapolly hill,	Mysoor.	13	2	23	2	21	56	77	56	32
Hemapoorum hill,	Mysoor.	13	3	23	2	46	47	77	32	43
Oosoottah Redgah,	Mysoor.	13	4	24	2	28	13	77	50	17
Doddy Fort,	Mysoor.	13	15	3	2	32	20	77	45	51
Kondima hill, pagoda	Mysoor.	13	15	36	2	37	20	77	41	10
B. Bellapoor, Redgah	Mysoor.	13	17	39	2	43	15	77	35	18
Cuerkel hill,	Mysoor.	13	19	50	2	55	50	77	19	40
Kalbetah hill,	Mysoor.	13	25	38	2	39	8	77	39	22
Mandy droog, (pagoda)	Mysoor.	13	26	2	2	45	3	77	33	27
Ranganaswamy hill, pagoda	Mysoor.	13	28	3	2	41	13	77	36	11
Gooldsoondah droog, pagoda	Mysoor.	13	36	38	2	37	4	77	45	26
Beggarth N. E. angle of the Fort,	Mysoor.	13	47	13	2	47	14	77	51	16
Kanticondah droog, remarkable stone,	Ced. Districts.	13	49	54	2	28	25	77	50	3
* Verraconda,	Mysoor.	13	55	3	2	36	5	77	42	25
* Doddawundrum,	Mysoor.	13	59	44	2	46	30	77	32	0
* Paacker,	Mysoor.	14	6	23	2	56	31	77	18	69
* Ouseondah,	Ced. Districts	14	15	51	2	38	41	77	36	45
Dharavaram great building,	Ced. Districts	14	24	35	[illegible]	1	49	77	46	41
Eenhangapilly hill pagoda	Ced. Districts.	14	26	55	2	44	8	77	24	32
Jaladapilly hill,	Ced. Districts.	14	31	57	2	50	58	77	27	32
Dharavaram,	Ced. Districts.	14	40	37	2	36	16	77	42	15
Anchatypoor Fort,	Ced. Districts.	14	40	58	2	39	39	77	39	51
Oodiry redoubt,	Ced. Districts.	14	40	68	2	54	29	77	24	1
* Plumly hill,	Ced. Districts.	14	57	55	2	40	10	77	38	14
South end of the base,	Ced. Districts.	15	0	58	2	36	25	77	42	3
Mudjur, Carroor,	Ced. Districts.	16	1	35	2	52	5	77	26	25
* Boglenaverconda	Ced. Districts.	15	4	46	2	45	6	77	35	24
North end of the base,	Ced. Districts.	15	5	52	2	38	42	77	39	47
* Nerthi head,	Ced. Districts.	15	6	0	2	38	46	77	39	44
* Kotakoondoo hill,	Ced. Districts.	15	6	43	2	52	9	77	26	26
Gooty droog flat rock	Ced. Districts.	15	6	53	2	36	8	77	42	22
* Gutlaer Woodo, pagoda	Ced. Districts.	15	7	23	3	0	28	77	17	42
* Bilecondah,	Ced. District	15	10	46	2	44	13	77	34	17
Mokzvalgha cavalier,	Ced. Districts.	15	14	5	3	11	36	77	6	34
Ravilly droog platform,	Ced. Districts.	15	17	8	2	30	38	77	47	54
Middigheri, pagoda	Ced. Districts.	15	35	7	2	50	15	77	28	15
* Goodalhoor,	Ced. Districts.	15	18	54	3	14	40	77	3	47
* Koolnoordah,	Ced. Districts.	15	10	24	[illegible]	[illegible]	[illegible]	77	39	53
Goulem, (turret)	Ced. Districts	15	21	17	3	11	47	77	3	49
Hanoygoondroo, pillar	Ced. Districts	16	22	3	2	3[illegible]	26	77	45	10
* Pullicondah,	Ced. Districts.	15	23	41	2	44	35	77	33	51
* Arrakeer saberah,	Ced. Districts	15	24	39	3	9	5[illegible]	77	14	[illegible]

NAMES OF PLACES.	Countries and Provinces	Latitudes.			Longitudes from Madras observ.			Longitudes from Greenwich.		
Naraniky droog, turret	Ced. Districts.	14	28	14	3	5	43 W.	77	12	47 E.
Poolycondah, ...	Ced. District.	15	28	16	2	39	17	77	39	13
Hidelpoondah, ...	Ced. Districts.	15	30	6	3	[illegible]	31	77	5	[illegible]
Durancondah, ...	Ced. Districts.	15	32	8	2	49	6	77	36	[illegible]
Kotaiul hill, ...	Ced. Districts.	15	3[illegible]	13	2	56	32	77	21	55
Tunnaeul hill, ...	Ced. Districts.	15	38	35	2	43	27	77	35	8
Adonidroog, building	Ced. Districts.	15	38	53	2	58	30	77	20	0
Goodieul betts, ...	Ced. Districts.	15	44	44	2	47	29	77	31	1
Bedderh Toomul, pagoda	Ced. Districts.	15	45	54	2	59	31	77	18	59
Jaggerpant, ...	Kurnool.	15	45	53	2	13	14	78	5	16
Ohtona Toomul, turret on hill	Ced. Districts.	15	47	30	3	36	41	77	21	49
Knumnguit, ...	Ced. Districts	15	48	42	2	52	21	77	20	9
Kerna Bellagul, ...	Ced. Districts.	15	49	50	2	34	14	77	44	16
Kurnool Fort, Lual Battery	Kurnool.	15	49	58	2	12	10	78	6	20
Kossgy hill, ...	Ced. Districts	15	51	11	3	0	36	77	17	54
Ruder Bellagul, ...	Ced. Districts.	15	52	24	2	57	17	77	21	13
Rajovelly, pagoda	Doab.	15	52	56	2	26	27	77	51	53
Naugeldinny, pagoda	Ced. Districts.	15	54	59	2	31	6	77	37	14
Mandevoma, ...	Ced. Districts.	15	57	29	2	58	10	77	20	20
Kondally Sungum, pagoda	Kurnool.	15	57	56	3	0	11	78	18	19
Toongo Budda, turret	Doab.	16	58	26	2	57	54	77	20	36
Tunnaeul hill, pagoda	Doab.	16	58	35	2	31	3	77	47	27
Gutt Bichalla, ...	Doab.	16	59	27	2	56	43	77	21	47
Moorzoondah N. E. angle	Kurnool.	16	0	42	1	59	33	78	16	57
Poddocoonva hill, ...	Kurnool.	16	1	3	1	46	56	78	31	34
Pauktoor Fort, N. W. angle	Doab.	16	1	43	2	11	43	78	0	40
Pauktoor Gedgah.	Doab.	16	1	43	2	12	4	78	0	20
Marra Moonigalla, ...	Nizam.	16	2	0	2	12	42	78	5	48
Yellacondah, ...	Nizam.	16	3	0	2	19	37	78	8	53
Mallihad, ...	Doab.	16	8	15	2	54	6	77	24	24
Anuntapooram Hill, pagoda	Doab.	16	11	54	2	28	14	77	56	16
Rachoor droog, building	Doab.	16	12	1	2	54	10	77	24	20
Yastumcondah, ...	Nizam.	16	13	37	1	58	29	78	20	1
Darroor hill, ...	Doab.	16	13	42	2	56	36	77	42	52
Sheikpoor hill, ...	Nizam.	16	18	49	2	19	16	77	59	14
Goddawal pagoda	Doab.	16	21	16	2	27	10	77	51	20
Pauugul droog, ...	Nizam.	16	22	59	2	7	17	78	14	13
Merchade Fort, ...	Doab.	16	16	32	2	57	6	77	21	[illegible]
Chanderragudda droog pagoda	Doab.	16	23	51	2	32	20	77	46	16
Narsawah Mosque, ...	Nizam.	16	26	14	2	34	43	77	[illegible]	47
Balchacker peak, ...	Nizam.	16	40	57	2	59	12	77	19	18
Gurromuttes, ...	Nizam.	16	27	4	3	24	12	77	[illegible]	48
Kooppilly hill, ...	Nizam.	16	28	27	2	59	14	77	23	18
Mudgul Gedgah, ...	Nizam.	16	29	54	2	35	16	77	37	14
Jackly pagoda	Nizam.	16	29	59	2	46	16	77	36	20
Maddmoor Mosque, ...	Nizam.	16	31	6	2	35	23	77	23	7
Ghanpoora droog, ...	Nizam.	16	33	53	2	13	49	78	6	21
Ooldoor Fort, cavalier	Nizam.	16	39	4	2	45	57	77	34	3
Tupahgutt, ...	Nizam.	16	42	39	2	30	0	77	42	30
Kotkondah droog pagoda	Nizam.	16	44	48	2	[illegible]	35	77	50	54
Yaleghur droog, ...	Nizam.	16	45	56	2	[illegible]	47	77	12	13
Narrapoor (dome)	Nizam.	16	46	10	2	45	34	77	38	56
Kandakoor hill, ...	Nizam.	16	47	34	2	53	28	77	23	37
Goodda Mutteul Gedgah, ...	Nizam.	16	0	37	2	52	9	77	26	31
Kaunkoorter, ...	Nizam.	16	54	35	2	47	27	77	24	3
Pochanahgutt, ...	Nizam.	16	57	41	2	47	3	77	59	18
Kota Koddangel, ...	Nizam.	17	8	4	3	36	47	77	41	43
Pargy hill, ...	Nizam.	17	12	39	2	29	49	77	37	41

NAMES OF PLACES.	Provinces and Proprietors.	Latitudes.	Longitudes from Madras Observ.	Longitudes from Greenwich.
* Ammonkal new hill,	Nizam.	17 16 55	2 23 51 W.	77 54 38 E.
Kerroo Mo[illegible] Mo[illegible]	Nizam.	17 24 57	2 19 30	77 59 0
Nagareddipally,	Nizam.	17 20 11	2 19 20	77 59 10
Pepeconda hill, pagoda	Nizam.	17 30 27	2 10 [illegible]	78 8 24
* Kotamarpally hill,	Nizam.	17 30 32	2 27 9	77 51 21
* Pepeconda hill,	Nizam.	17 30 43	2 10 54	78 7 34
Kocaulgi hill,	Nizam.	17 33 18	2 21 3	77 57 27
Jeppere building	Nizam.	17 37 50	2 9 36	78 8 24
G[illegible] Fort N. W. angle,	Nizam.	17 39 21	2 23 32	77 54 38
* [illegible] hill,	Nizam.	17 39 3	2 24 57	77 53 39
Cop[illegible]ally pagoda	Nizam.	17 40 37	2 63 52	77 34 33
* [illegible]lapally,	Nizam.	17 45 50	2 33 9	77 43 41
* Gandmoodoo,	Nizam.	17 48 38	2 17 14	78 1 16
[illegible] hill, pagoda	Nizam.	17 50 16	2 10 36	78 7 54
[illegible], remarkable tree,	Nizam.	17 52 37	2 18 3	78 0 27
* [illegible] hill,	Nizam.	17 53 38	2 38 47	77 39 43
[illegible], forest	Nizam.	17 54 27	2 29 16	77 49 14
Bo[illegible] Mo[illegible] high minaret,	Nizam.	17 54 37	2 43 18	77 35 12
* Dumalai,	Nizam.	17 56 17	2 42 36	77 35 52
Chittoorga Fort,	Nizam.	17 57 38	2 24 1	77 54 29
[illegible] Fort,	Nizam.	18 1 30	2 34 22	77 39 8
* East end of the base,	Nizam.	18 2 46	2 34 [illegible]	77 49 38
* West end of the base,	Nizam.	18 3 21	2 40 8	77 38 22
* Dammeraddi,	Nizam.	18 3 21	2 3[illegible] 9	77 43 31

Note.—All places marked with the asterisk (*) are geographical stations.

II.

On the existence of the Hindu religion in the island of Bali.

By JOHN CRAWFURD, Esq.

THE *Hindu* religion, which was at one time extensively [illegible] throughout the oriental *Archipelago*, and constituted the belief of [illegible] tribes which had emerged from barbarism, or made any progress [illegible] social order, now exists only on the island of *Bali*, as the predominant religion.

THAT the *Hindu* religion has prevailed on *Bali* is a fact which has been long known; but I am not aware that any precise information has been made public on this curious and interesting subject. I shall endeavour to supply the deficiency, as well as my own narrow experience and my want of previous preparation for so difficult a task will enable me. The details which I am about to lay before the Asiatic Society are chiefly the results of my own enquiries on the [illegible] were supplied to me through the liberality of the elder prince of [illegible] *Bali*, who took no opportunity of gratifying my curiosity. He carried some of the most intelligent *Balinese* [illegible] to supply me with the information I required; and [illegible] and good humour supplied himself [illegible]

which, a superable acquaintance with the *Malay* language, rendered him perfectly competent. If the honour of his person was concerned, I must observe, that I met with the most perfect candour and courtesy, without any [illegible] hence or reserve; on the contrary, an anxious desire [illegible] my curiosity; and even a satisfaction displayed at the trouble apparently taken in what so nearly concerned [illegible]. Religious intolerance, indeed, is a vice far removed from the disposition of the inhabitants of all these islands, whether *Mahomedans* or *Hindus*.

When interrogated respecting their religion, the natives of *Bali* say, that they are of the religion of Siva, (*Agama Siva*), or of the religion of Boudha (*Agama Budha*); but as almost all knowledge of their religion is confined to its ministers, whose opinions and doctrines the people implicitly subscribe to, it is usual to say "the religion of the *Brahmans* of Siva," and "the religion of the *Brahmans* of Budha," instead of those general appellations.

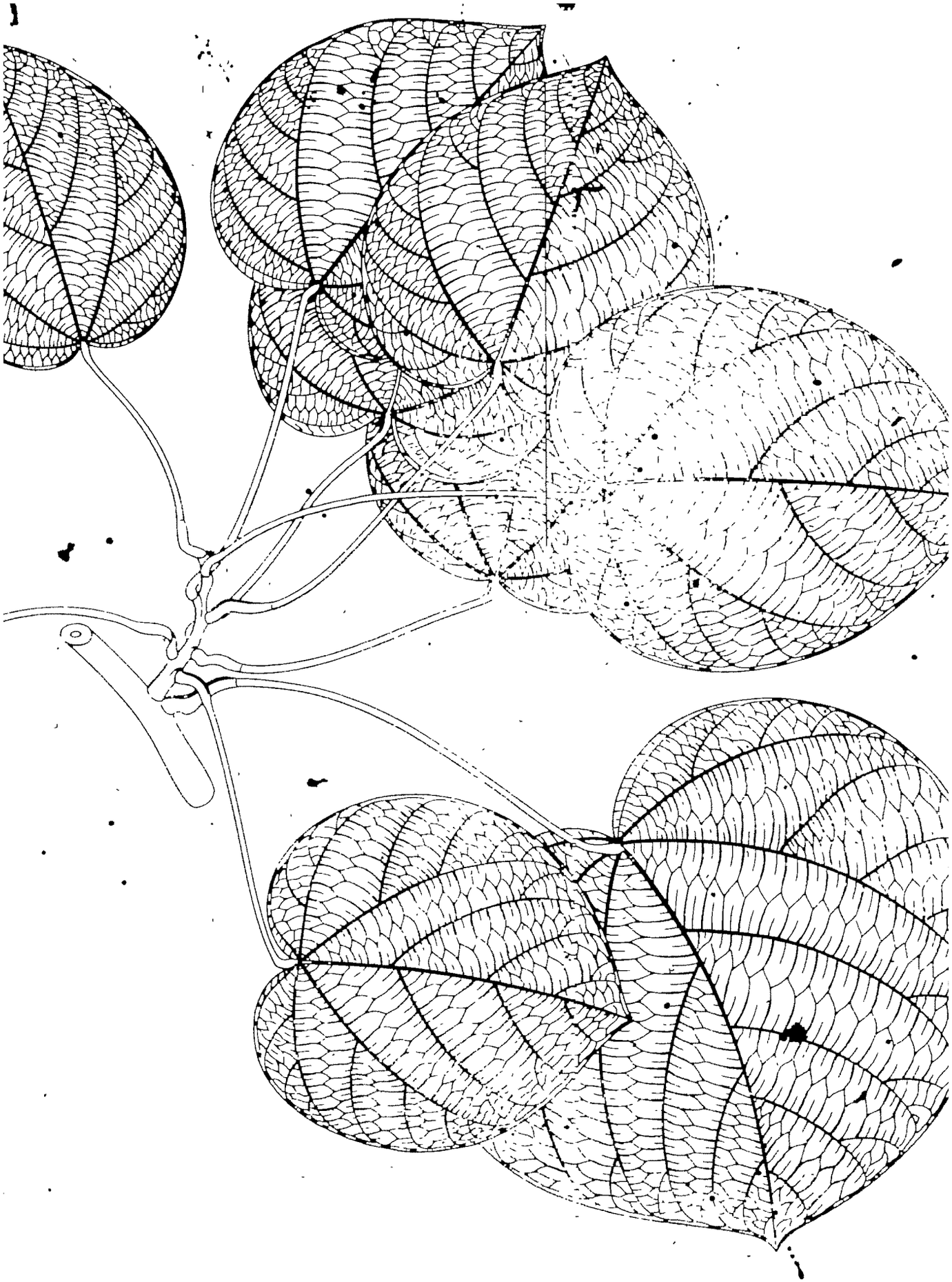
[illegible] of the *Hindoos* of the sect of Siva only, that I can furnish any detailed information. The *Buddhists* are few in number. In the territories of the family of *Kin-ag-gian*, constituting perhaps not less than one half of the island, there were but three small districts chiefly occupied by the worshippers of Budha, and these were distant from the part of the island which I visited. The name of one of these districts is worth remembering, for the inference which may be drawn from it. It is called *Heja Budaha*, which means the country of the *Budhists* of *Kalinga*.

The followers of Budha are spoken of by those of Siva more with contempt than with reverence; they are a sect of beings not likely to be [illegible] by any [illegible] of [illegible], and which light the *Buddhists* are evidently looked upon by the *Brahmans* in their conversa-

[illegible] often [illegible] expressions, which they [illegible] that they entertained no respect whatever for the followers of the opposite worship. The sect of Siva may indeed be denominated the national religion, as the religion of nine-tenths of the people, of every [illegible] in the island, at [illegible] every time in power.

The followers of Siva on *Sail* are as in western India divided into four great classes or castes, viz. a priesthood, a soldiery, a mercantile class, and a servile class, respectively thus denominated; *Brahmana, Satriya, Wisya* and *Sudra*. Making due allowance for the imperfection of the alphabet in use among the tribes of the eastern islands, I believe the terms will not be found to differ much from the original orthography, an observation which as far as I can judge applies to the numerous class of words introduced from the *Sanskrit*. The following origin of the castes was distinctly stated by the *Brahmans* [illegible] BRAHMA produced the *Brahmana* from his mouth, which imports wisdom; the *Satriya* from his chest, which imports strength and government; the *Wisya* from the abdomen, which implies that it is his business to furnish subsistence for the society; and the *Sudra* from the feet, which implies that he is destined to obedience and servitude. The *Brahmans* made this statement without any having put any question that could lead to it; for which reason it is hard to repeat that to the Hindu scholar must have the appearance of mere common place. The institution of the castes is termed by the *Balinese*, *Chator jahna*.

The *Brahmans* are held in high respect; they will not condescend to eat with any inferior class. It is held unworthy of a *Brahman* to humble himself before any individual, and he will scarcely condescend to make a common obeisance even to his prince. The first is on the ground is derogatory to his rank. To [illegible] this doing so, I observed that at *Bleling* in the apartment where the *Raja* received us, there was constructed a pen[illegible] for well [illegible]



From the ground floor of this the *Brahmans* ranged themselves, in the audience chamber of every Raja I was given to understand that there was a similar array. The person of a *Brahman* is held inviolable; and hardly any circumstance of aggression on his part will warrant taking his life.

The common classes cut the hair short in the same way that the *Siamese* do. The *Brahmans* alone wear it long, twisted as the *Hindus* of western *India* do, in a knot behind the head. From this circumstance it was no difficult matter to distinguish them. In a superior regularity of features, and the absence of the flat and often bruised lines of the *Malay* visage, I imagined, with others of my countrymen, that their *Indian* origin, could easily be traced. This will be thought the less improbable when it is recollected that the present generation is but the tenth removed from the first stock that settled on the island. The superior classes may take concubines from the inferior; but the opposite practice is totally interdicted. The offspring of such unions, as in continental *India*, forms a variety of new castes. A legal marriage, however, can be contracted only between persons of equal rank, so that the four great classes are in this manner preserved distinct.

Among the *Hindus* of *Bali* as well as in *India*, there exists a class of outcasts called as there *Chandala*. These are held impure, and being excluded from associating with their fellow subjects, occupy the outskirts of the village. Potters, dyers, dealers in leather, distillers, and retailers of ardent spirits, are of this order.

Hitherto I have described practices and institutions nearly parallel with those of *India*; but there are others, to judge from which, the natives of *Bali* would hardly deserve the name of *Hindus*, in our appreciation of the customs and habits, which ought to be ascribed to the latter

The singular prejudices of the *Hindus* on Continental *India* on the subject of food, are all qualified in practice, or altogether neglected by those of *Bali*. The lower classes are by no means punctilious on the subject of diet, and the *Brahmans* who alone attend to distinctions of this kind, reconcile them with such modifications, as render their observance very wide of the *Indian* practice, as far as my limited acquaintance with both will enable me to judge.

The *Balinese* venerate the cow: but they assign as the reason for paying no peculiar honour to the common breed found on their own island, that it is not the one which their religion commands them to respect. The breed of oxen found on *Bali* is of the wild species, usually called *Benteng* by the natives of these islands. It is of a remarkably large size, and fit for any purpose of agriculture, but wants the hump which characterizes the *Indian* cow, and which would seem necessary to entitle the animal to sanctity. On *Java*, I have seen many images of the *Bull Nandi*, the vehicle of Mahadeva, with an enormous hump, evidently showing that the ordinary cattle of these countries did not afford the models from which such sculptures were made. The Raja of *Blelling* expressed a great desire to have one of the *Indian* breed, and wrote me to this effect on my return to *Java*. I had the satisfaction to procure a white bull and cow of the *Gujrat* breed, which were sent to *Bali*, and reached the Raja in safety.

The ordinary ox of *Bali* is decidedly held in no respect, for the inferior castes eat beef without scruple. The Raja supplied our troops with abundance of cow beef in preference to that of the buffalo, which is more esteemed among the *Balinese*. The cattle were slaughtered on the beach within a few yards of the house where the Raja resided: and this without offering violence to his own prejudices, or those of any class of his subjects.

The *Brahmans* indeed abstain from eating beef and every species of animal food whatever. Their diet is purely vegetable; they even sometimes go so far as to refrain from culinary roots or bulbs, confining their diet to roots and fruits. Neither milk nor any preparation from it, is used as food. This is however easily explained. The cattle of the oriental islands yield too scanty and precarious a supply to constitute an article of food. The *Brahmans* of *Bali* dwelt upon this circumstance, and said that their books recommended to them the milk of the cow, and a certain oily preparation from it as the most excellent of all diet: but that it was their misfortune that the cattle of their islands did not afford them the food so peculiarly prescribed to them by their religion.

In *Bali* there are no *Fakirs*; no mendicant devotees such as overrun western *India*. Neither as far as I could discern is there any thing known of those absurd penances, and those whimsical and painful practices by which the *Ascetics* of western *India* recommend themselves to distinction. The austerities of a *Brahmana* or *Pandita* on *Bali* consist of exercises of self-denial; such as abstinence from certain descriptions of food, exclusion from the society of mankind, and retirement to caves and forests. Celibacy is occasionally but rarely in the list of meritorious austerities. The three inferior classes among the *Balinese* seem to me to eat indiscriminately of every species of animal food, commonly deemed eatable; among those, pork is evidently the favorite food. We saw great numbers of hogs of an excellent kind which seemed to be taken great care of. They constitute indeed the principal animal food of the people. At an entertainment given to the officers of the expedition by the Raja, at which he himself presided, pork dressed in a great variety of forms, made up the largest portion of the feast. The *Brahmans* alone refuse to eat with the inferior castes. At this feast

the Raja drank [illegible] prepared [illegible] by his attendants, who were [illegible] and did not scruple to receive [illegible] beverage handed to him by a *Chinese*. An [illegible] peculiar [illegible] the unreasonable prejudices of [illegible] on a subject in which [illegible] different, [illegible] agreeably surprised to [illegible] almost total absence of all prejudices on this point in the people of one of the oriental islands. On *Bali* one might see a *Hindu*, a *Chinese*, a *Mahomedan*, and a *Christian*, sit at the same board and partake with him, exception of the same fare.

THE *Buddhists*, from the account I received of them from the *Siamese*, are still less scrupulous in the matter of diet than the latter, who mention of them as a matter of reproach, that they did not hesitate to eat carrion and the flesh of dogs.

NEITHER the *Brahmins*, nor the other three-born classes of *India* wear the thread, which is their usual badge in *India*, nor did I observe the use of any sectarial mark whatever. The want of the latter may be easily accounted for; for where nearly all one of the three distinction becomes superfluous. The absence of the thread is certainly singular, and calculated to excite suspicion respecting the purity of their extraction. The first settlers, necessitated to intermarry with the natives of the country, might still regard the injunction of religious [illegible], as to deny to their contaminated posterity, the use of the [illegible] of their order.

A BRAHMAN of *Benares*, one of our sepoys was introduced into the presence of the Raja. He acknowledged that the *Balinese* were degenerated *Hindus*; but added [illegible] that all the rest of the world but his own countrymen were so too. I need hardly observe that he and my *Bali* friends were [illegible] to each other.

[illegible] ather the sacerdotal cord which he wore: but the [illegible] incomprehensible to them.

Of [illegible] ms which certify the essential *Hinduism* of *Bali*, there is none of so decided and unequivocal a character, as the sacrifice of the woman on the funeral pile of her lord. The following is a short account of the ceremony as practised on *Bali*. When a wife offers herself the sacrifice is termed *Satya*; if it be a concubine, slave, or other domestic, it is called *Bela*. A woman of any caste may sacrifice herself in this manner; but it is most frequent with the *Satriya* and *Wisiya*. It very seldom happens that a woman of the servile class thus sacrifices herself; and what is still more extraordinary a woman of the sacerdotal order never does.

In the vicinity of every town or large village, a place is set aside for the solemnity. It is the same where the common dead are burnt. On our march to the palace of the Raja, which is two miles from the shore, we saw a place of this kind where many victims had perished. In a pit which was there, there were still some ashes, the relicts of the last sacrifice. The Raja informed me that Captain Sayer of the royal navy, and some of his officers were present three years ago, when two young females sacrificed themselves at this very place. In the manner of performing the ceremony, I could not find that there was any thing which differed from the practice in the southern parts of *India*.

[illegible] the most remarkable circumstance, connected with these sacrifices, is the great number of women who on particular occasions offer themselves. The Raja stated that when his father's body was burnt, the incredible number of 74 women sacrificed themselves with it. I know from the [illegible] of persons who were present, that so

women sacrificed themselves last year on the funeral [illegible] of [illegible], one of his sovereigns of *Lombok*.*

The Raja of *Blelling* informed me, that there [illegible] of train than encourage the women on such occasions; and [illegible] *dans* of *Bali*, a less suspicious source of information [illegible] subject, declared that they never knew an instance of force or overpersuasion on such occasions. An instance of humanity and reason it may be presumed not very frequent, is well worth recording. Rague Jasanrego, a prince of *Karangassam* on *Bali*, who died but a few months ago, directed on his death-bed, that neither his wives nor his domestics should sacrifice themselves on his funeral pile. As the bodies of the dead are preserved for a great length of time after death, it seems reasonable to suppose that grief can have little share in the motives which induce the women to determine upon these sacrifices. The meritoriousness of the sacrifice, the honor it confers, and the rewards and distinctions which are thought to await the victims in a future state of existence, I was assured by the *Balinese*, were the only motives which excited the women to destroy themselves on this occasions. The Raja discoursed with me freely on the subject, and seemed to smile at the simplicity of the poor women; though I will not pretend to affirm with how much sincerity.

The *Hindus* of *Bali* like those of *India* burn the bodies of their dead. In the treatment observed in other respects, the only circumstance which seems to differ from the practice of the *Hindus*, is the long period which it is customary to preserve the body previous to burning it. This is always in proportion to the rank of the deceased. The bodies of persons of the lowest order, are usually preserved for some weeks; and those of persons of rank often for a period exceeding a

* Lombok, the principal population of which is *Balinese*, was conquered about 50 years ago by a prince of *Bali*; and is still in subjection to the *Balinese*.

year, sometimes near two. A fortunate day must be fixed upon by the *Brahmans*, before the body can be consumed. During this time it is embalmed, and kept in apartments constructed for the purpose. A relation of the rajah died some months before our arrival on *Bali*; and his body had then not been consumed. My curiosity was excited respecting it, as four women had given out their intention of burning themselves with it. I therefore interrogated the ambassadors, who came to *Java* four months thereafter, respecting it; and found that it had not yet been burnt, the *Brahmans* not having been able to determine on a fortunate hour for this important purpose.

The *Balinese* esteem the burning of the dead body a sacrifice to BRAHMÁ, whose emblem they say that element is, agreeably to which BRAHMÁ in their language and in that of *Java*, has become an appellation for fire.*

How the *Buddhists* of *Bali* treat the dead, I have not been able to learn. When *Hindaism* prevailed on *Java*, a sect on that island exposed the bodies of the dead to the open air, as is now done by the inhabitants of *Tibet* and parts of *Tartary*, and by the *Persian* worshippers of fire. This mode of treating the dead was termed *Sevaga* and considered in the light of an oblation to the deity of the Sun (Surya). Gold trinkets and beads are now and then found on *Java*, and seem to have been the ornaments worn by the dead on such occasions. It is probable that the sect which treated the dead in this manner were *Buddhists*. The *Brahmans* of *Bali* do not perform any rites or ceremonies of religion in the temples. The priests are persons of an inferior rank generally *Wisyas* or *Sudras*, who are [illegible] guardians of the temples,

* Proper names in *Sanskrit* are [illegible] often adopted as appellatives in the language of the *Javanese* islands. Thus, *Brahma* a fire; *Cali* a river; *Ganga* water; and *Mendra* and *Pawana*, the wind.

The *Brahmans* even went the length of asserting that they paid adoration to no idol whatever, a singular circumstance certainly if true. My own want of sufficient experience will not allow me to decide upon the accuracy of this statement. I must, however observe, that I was a good deal surprised not to meet on that part of *Bali*, which we visited, any images of *Hindu* worship, such as I had been accustomed to see in great numbers on *Java*. I have reason to believe, notwithstanding the strong assertions of the *Brahmans*, that *Hindu* temples really exist in the interior of the island, though they be not common.

The *Brahmans* are intrusted with the whole of the administration of justice, civil, criminal and ecclesiastic. Contrary to the practice of *India*, which places the magistracy in the hands of the military class, it is here the exclusive province of the priesthood, who are possibly from the possession of such valuable temporal authority, induced to leave the common ritual of religion to their inferiors.

In every village there is one or more places of worship. I visited two of these rude temples, which in the language are denominated *Sanga*. They consisted of a square enclosure, the wall of mud, without any other covering than what the shade of an *Indian* fig tree afforded. Upon entering we saw nothing but a few wooden presses of the rudest construction, containing some cups with oil and wicks prepared to be lighted up at night. A *Sudrá* entered one of these temples with us, who seemed very anxious to satisfy our curiosity as far as lay in his power. He approached the wooden presses with great reverence, prostrating himself before them; and muttered some prayer which we could not understand. I asked him through an intrepreter, to whom he paid his adorations; and he said to the great god of the ocean (Deva agun Ságara.) The temple was within a few yards of

the sea, and dedicated to the *tutelary* god of that element.*

The vulgar worship of the people differs widely from the religion of the *Brahmans*. I conversed with the latter on this subject, who seemed to look down on the vulgar superstition with much contempt. With the populace every spot is supposed to have its guardian deity, to whom a temple is raised. He ranks according to the extent or importance of the place he protects. Every nation on *Bali* has its peculiar *tutelary* god; so has every village. The mountains, forests, and rivers are in the same way imagined to have their respective guardians. It is to these that the gross worship of the common people is chiefly addressed, while the *Brahmans* and those instructed by them, worship the gods of the *Hindu* Pantheon.

Among these, Maha-deva or Siva is chiefly invoked. The *Balinese* call him most frequently Prama Siva "The Lord Siva"; but he is known to them by most of the many names and epithets bestowed on him in the *Hindu* mythology. He is the same deity so familiar to the converted natives of these islands under the title of *Battaraguru*. They paint him as an angry and powerful tyrant; in this respect agreeing not less with his character of destroyer in the *Hindu Triad*, than with the attributes of the chief deity of a barbarous people ever mischievous and malignant. On *Java* where the *Hinduism* which prevailed was, as now on *Bali*, of the sect of Siva and of the heresy of Buddha, a great variety of images of the peculiar objects of the worship of these two sects are to be met with, while one seldom sees any relicts of the images more immediately connected with the worship of Vishnu. The *Balinese* have two great religious festivals, each of which occurs twice a year, the one succeeding the other at an interval of ten days. The first in point of

* Within 20 yards of the temple, there was a cock-pit, in which there were full 100 cocks ready trained. The *Balinese* are great cock fighters.

time is *Gala*, and is of five days duration; the second is called *Hagiar*, and is of three days duration. Their festivals take place in *December* and *June*, the first being the time in which the grain is cultivation commences, and the second is in which the harvest is reaped; in those the spring and harvest are those for their annuities. They answer may presume to the festivals of the *Bili*, and *Charak* honour of Durga in *India*.

These festivals are dedicated to rejoicing festivity, and the worship of the gods, not deemed incompatible with each other. All serious occupation is interrupted; even war at all other times carried on with the relentless ferocity common to *Barbarians*, is deemed unlawful during the celebration of these festivals.

Whatever be the religion of the tribes of the oriental islands, one general observation applies to all, that sentiments connected with it make no deep or permanent impression upon them. The principles of the *Eastern Islands Hindus* are neither exclusive nor unsocial; nor are their institutions marked by that character of permanency and immutability which we ascribe to the native institutions of *India* and *Mahomedanism*, as it is practised here, is nearly stript of its zeal and intolerance.[c] Considerable intercourse of the *Javanese* in particular has fully convinced me that they regard the precepts of the *Koran* only when perfectly convenient to them. I do not apply this observation particularly to the common people, whose those of other countries, often want time and opportunity to give their attention to such subjects; but to the wealthy and better educated society, who enjoy the requisite leisure and who are not deficient of the intelligence or acuteness that might be supposed necessary to con-

[c] The principal and commercial ports of the island of the *Malays* and the principal people are stricter *Mahomedans* than those in other parts. I have an intimate connexion and a longer intercourse with foreign *Mahomedans* than most other

ſideration of ſuch ſubjects. Among theſe there is not an example, one in a thouſand, who abſtain from the open uſe of wine; and in the native courts of juſtice the intereſt of money is ſued for as openly and with as little ſcruple, as in the moſt commercial ſociety in *Europe*.

These people are at the ſame time to a wonderful degree ſimple and credulous. It is neceſſary to know them, to be able to underſtand, with what facility they ſometimes lend their belief, to the moſt marvellous and improbable fictions; more particularly if recommended through the medium of religion.

This character renders the *Javaneſe* the perpetual victims of deluſion and impoſture. No great plant ſtrikes a deep or firm root in ſuch land, which is the natural ſoil of the periſhable weeds of ephemeral and puerile credulity. Laſt year it was almoſt as if by accident diſcovered, that a beautiful road, more then fifty miles in extent, had been made in a very ſequeſtered part of the iſland, and in the territories of the native princes. The population of whole diſtricts was employed in making it; but for what purpoſe no one could ever diſtinctly tell: Some enthuſiaſt it was ſaid had dreamt or prophecied, that a certain holy perſon was to make his appearance in a certain day and hour on the ſummit of a high mountain,* from which he would deſcend into the plain. A road would therefore be neceſſary for his accommodation; and each man inſtigated his neighbour to the pious undertaking. Five or ſix thouſand perſons were occaſionally at work upon it; and the road was nearly completed in a few months. The facility with which the people were diſſuaded from going on with the work when their uſeleſs toil was diſcovered, is not the leaſt remarkable circum-

* One of thoſe, called the brothers by mariners; perhaps, the moſt lofty in the iſland.

stance connected with this strange story. Were this the place, many other curious examples in illustration of the character of religion be adduced; and this is the result of our own short experience of these people. The natives of *Bali*, though I am less acquainted with them, I can venture to say partake much of the same disposition. It may be asked then, how it has come to pass, that while surrounded by *Mahomedan* tribes, they have resisted the introduction of the *Mahomedan* religion, so successfully and early propagated among the great population of *Java*.* This, I imagine, is to be ascribed greatly to the many refugees from the last island, who took shelter there on the establishment of the *Mahomedan* religion, and to the disgust naturally incident to an unsuccessful attempt on the national religion, which is known to have been made about the period of the conversion of the surrounding tribes. But perhaps, above all these causes, it may be ascribed to the powerful opposition which it is reasonable to conclude the intelligence, art, and experience of the colony of *Brahmans*, then so recently arrived from India, would make to the intrigues of the *Mahomedan* missionaries.† Even at present the *Balinese* are more pertinacious, and guarded on such points than I could have expected to find them, judging only by experience of their neighbours.

The elder Raja of *Belling*, whom I have so often mentioned, having requested me by letter to send him some *Javanese* books; I transmitted among others a *Mahomedan* theological treatise, translated from the *Arabic*, called "the history of all the prophets." He returned it to me by the first opportunity with the following civil and cautious, but very intelligible reply. "The subject of the book which my friend has sent me," says the Raja, "is of a very *worldly* nature. I even fear to

* The population of *Java* is said to exceed four millions, forming perhaps the most numerous native state that ever existed in the southern hemisphere. Four-fifths of it speak the same language.

† *Bali* means to return, to fall back; a name given to the island, it is said, by the *Mahomedan* zealots, who attempted its conversion; in allusion to the people having declined into *Pagandan*, after once embracing the faith of *Mahomed*.

keep such a performance in my possession; and trust therefore he will not be displeased that I return it."

A few years ago a prince of the *Karang-assam* family,* who are sovereigns of *Lombok*, having visited the neighbouring island of *Sumbawa*, the principal population of which is *Mahomedan*; was circumvented by the art of some *Mahomedan* priests, and became a convert to their religion. Ketut Karang Asiam, his sovereign and relative, highly incensed at his apostacy, immediately withdrew from him his support, and even forbid him his country. The unfortunate prince in consequence wandered about for many years a wretched outcast; and at last perished by shipwreck on the coast of *Ceylon*, on his return from a pilgrimage to *Mecca*. The *Mahomedans* look upon him as a martyr, and his story is a subject of frequent conversation with them.

The *Balinese* however carry their jealousy no farther than seems reasonably necessary to their own security, against the attempts of a religion decidedly hostile to their own. Both the *Mahomedans* and *Chinese* enjoy the most undisturbed exercise of their respective worships; and the same indulgence would be extended no doubt to any other peaceable sect. The *Mahomedans*, though excluded from settling in the interior, or exercising any office directly connected with the details of domestic policy, are admitted to employments of trust and emolument about the persons of the princes. The confidential minister of the Raja of *Blelling*, I found was of that persuasion. Some of the *Mahomedans* themselves gave me to understand, that the protection of some of the native princes was carried to a still greater length, some going so far as to insist with their *Mahomedan* subjects upon a more punctual performance of the duties of their religion, than was suited to the lukewarm devotion of many of them.

* The princes of this family, but they alone, of the sovereigns of *Bali* and *Lombok*, are of the *Wisya* or mercantile class; the rest uniformly of the *Satrya* tribe.

One of the Rajas of [illegible] have already mentioned, a venerable old man of 80, who is now on the throne, is distinguished for his attention to this singular kind of discipline, so entirely however in the spirit [illegible] often ascribed to [illegible].

The learning of the [illegible] is contained in a dead language, called *Kawi*. The *Kawi* bears the same relation to the vulgar dialects of the *Archipelago*, that the *Sanscrit* does to the *Prakrit* dialects of [illegible]; or as the [illegible] does to the languages of the [illegible] *India*. It is the language of learning, of religion, and of the [illegible].

The *Kawi* may be written either in the modern character of *Bali* and *Java*, which are the same (see note A); or in a more ancient and perfect one, now nearly out of use, and also common to both. The modern alphabet contains 20 consonants and five vowel sounds, but has no characters for the initial and medial vowels. The ancient alphabet has the same number of consonants and vowels; two diphthongs [illegible] with characters for the medial and initial vowels. Both are formed on the principles of the *Deva Nagari* alphabet, and the ancient alphabet in particular bears it a very close resemblance. The *Kawi* in point of construction, partakes of that singular degree of simplicity, which is so universal a character of the languages of this part of the world. It differs from most of these in a frequent use of the passive [illegible] of verbs, amounting indeed to a sort of exclusion of their active ones, a want of a pronoun of the third person, and in placing the adjective in position placed before the noun.

Is the *Kawi* the original language of some nation of the continent of *India* imported by the first adventurers, or is it rather a language gradually formed by ingrafting upon the vulgar dialect of the aboriginal inhabitants of these countries, a large portion of the language, which contained the religious institutions and arts which the *Indian*

adventurers introduced among the barbarous and savage tribes of the oriental islands (see note B.)

WITH a thorough conviction of my own incompetence to decide on this question, I have endeavoured to collect the materials to enable the oriental scholar to do so, and have for this purpose appended to my essay a short vocabulary of *Kawi* words, and an extract from the *Kawi Mahabharat*, with an *English* version made through the medium of the common *Javanese* language. The translation is I hope as faithful as can be expected under such circumstances. (See Note E.)

ALL *Kawi* composition is in regular measured verse,* of which there are twelve radical stanzas, from which a variety of others may be formed, according to established rules of prosody. These rules are, I imagine, borrowed from those in use in *India*. To enable the *Sanscrit* scholar to judge, I specify the names of the 12 radical stanzas which are as follow: *Sardula-wikundita*, *Jaya-dita*, *Wahirat*, *Basanta-tilata*, *Wansa-patra*, *Srakdara*, *Sakarine*, *Swandana*, *Champakamalya*, *Prawira latita*, *Danda*, and *Katri-padma*.†

THE most popular and esteemed work in *Kawi* is the ‡ *Brata-yuda* or holy war, which I imagine is the great *Indian* poem the *Mahabharat*, or rather a *paraphrase* of it. The *Javanese* imagine it to be an original work, and do not scruple to point out on *Java* the site of ‖ *Astina* and the various scenes of the wars of the *Mahabharat*. The *Brata-yuda* was composed (I

* This confirms the etymological affinity between the word *Kawi*, and the *Sanscrit* terms *Cavi* a poet, and *Cávya* poetical composition.—*Note by the Secretary.*

† Of the forms here enumerated eight are decidedly *Sanscrit*, viz. *Sa'rdula vicri'dita*, *Vasanta tilaca*, *Vansapatra*, *Sragdhara*, *Sicharini*, *Champaca mala*, *Prawira la'tita*, and *Dan'd'a*; (see the table annexed to Mr. COLEBROOKE's essay on *Sanscrit* and *Prakrit* Poetry, A. R. vol. 10, p. 468); the remaining four have every appearance of being *Sanscrit* terms, though the change they may have undergone both in their pronunciation, and in the written expression of the sounds, makes it difficult to verify them.—*Ditto.*

‡ Probably, a corruption of *Bha'rata*, the family of BHARATA, amongst whose descendants the war occurs, and *yuddha* war.—*Ditto.*

‖ *Hastinapur* ancient *Debli*, or a city about 50 miles N. E. of the modern city of *Debli*, the capital of *Ind bish'i'bar*.—*Ditto.*

[illegible] or [illegible]) in the [illegible] year 1117, by [illegible] called Postorah. This date is invariably prefixed to every [illegible] of the work. The [illegible] mystical syllable *Om* or *Oum*, [illegible] pronounce it, is also [illegible] frequently prefixed, and [illegible] the genuine *Hindu* [illegible] of the poem. The language of the *Brata-yuga* is much more modern than that of several other works in *Kawi*.

In *Kawi* there is a version of the RAMAYANA, identified with the celebrated poem of VALMIKI, by a precise similarity of title, and (as far as my limited means of informing myself will enable me to judge) of style and subject. The language is more obsolete and obscure than that of the *Brata yudha*, and of the history of the composition nothing is known.

ANOTHER work in *Kawi* is termed I believe with sufficient accuracy *Nitti-Sastra*. It is a treatise on ethics in a style still more antiquated and obscure than either of the two last works.

A [illegible] and [illegible] work are called *Wanas* and [illegible]. These are legends of [illegible], whose names are great [illegible] in *Java* and *Bali*.

Of works on religion and law I can [illegible] than recall the [illegible] with which [illegible] *sans* of *Bali* fortified [illegible]. Proceeding [illegible] each name the [illegible] occurring, behold is as follows:—[illegible], *Turwadigama*, [illegible], *Kurera-nu-ara*, *Dangama*, [illegible], *Tawa*, [illegible], *Dasi-[illegible]*, *Sloka-it-[illegible]*, *Sa[illegible]* and *Gomiwagama*.*

* [illegible] of these works, as well as of numerous others [illegible] *Java* [illegible] *Bali* [illegible] a [illegible] of [illegible] of the works here specified is [illegible] in *Sanskrit* [illegible] consisting of whole pieces which are [illegible] by the Sanscrit

The *Brahmans* of *Bali* complained of the loss of some works of importance connected with their religion, and made anxious enquiry respecting their existence in *India*. I had not learning enough to give them a satisfactory reply; nor can I now even call to mind the names or titles of the works in question. The conversation unfortunately took place in a moment of haste, when it was out of my power to take notes of what passed on the subject.

I have looked in vain both on *Java* and *Bali* for any vestige of the *Hindu* scriptures or *Vedas*, and though I reasonably distrust the skill with which the enquiry was pursued, I am yet strongly inclined to believe, that they have no existence; and probably never had among the *Hindus* of the oriental islands. It seems singular enough, that an orthodox sect of *Hindus*, as the worshippers of Siva are, should not be in possession of the sacred text. The inferior casts among the *Hindus* are by the ordinances of their religion interdicted from reading the *Vedas*. Did the first *Brahmans*, who settled in the *Archipelago*, lie from some impurity or contamination under a similar interdiction; or were they pretended *Brahmans* only, and in reality persons of inferior rank, to whom the use of the *Vedas* was unlawful? Or lastly did the first *Brahmans*, compelled by necessity to intermarry with the aboriginal inhabitants, conscientiously forbid the *Vedas* to their polluted posterity?

Among the writings which exist in the *Kawi*, the purest source is the numerous inscriptions on stone and copper which are found on *Java*. These are all in the ancient character. From skilful translations of these, the history of *Hinduism* in the oriental islands will receive much elucidation. It is an interesting and important fact of these inscriptions that by far the greater portion of them have well defined dates. I have perused some nearly 1,200 years old. The greater portion however, do not exceed half that antiquity; but many refer to a series of dates long antecedent to the date of the inscriptions themselves. Of the style of

these inscriptions, I may believe [illegible] and enigmatical, abounding more in exhortations [illegible] of religious duties, than in any important matter of fact. [illegible] the sciences of *India* the *Brahmans* of *Bali* are in possession of, [illegible] means of ascertaining with any accuracy, and had such opportunity occurred, I should have been unable to avail myself of it for want of acquaintance with the original subject. The scanty remarks however, which I have collected on this subject, I willingly submit.

The *Indians* have taught the inhabitants of these island their *decimal* system of notation which is in common use on *Bali* and *Java*. Whatever progress the natives of these islands have made in astronomy, seems in a great measure also borrowed from the same source. Their year is lunar, consisting of 360 days, which they divide into twelve unequal portions called* *Masa* or seasons. The length of each is as follows:

1st,	41 days.
2d,	23 ditto.
3d,	24 ditto.
4th,	24 ditto.
5th,	26 ditto.
6th,	41 ditto.
7th,	41 ditto.
8th,	26 ditto.
9th,	25 ditto.
10th,	25 ditto.
11th,	23 ditto.
12th,	41 ditto.

* In *Sanscrit* and in *Hindi* derivatives a *month*; the lol. month is [illegible] in *Hindu* computation.—*Note by the Secretary.*

It is the business of the *Brahmans* to keep this reckoning and to adjust this calculation, which is solar, to the lunar year. It is a function of practical importance as the occupations of the husbandman are directed by these meteorological subdivisions of the year. Each season is appropriated to a particular employment, which the husbandman never commences till methodically warned to it by the *Brahmans*: what the *Brahman* does on *Bali*, the *Mahomedan* priest performs on *Java*.

The days of the week are, I may presume, evidently *Indian*, and so are the names of the signs of the zodiac: both are inserted in the catalogue* of *Kawi* words, that the *Sanscrit* scholar may be enabled to determine. Copper cups have been found in numbers on *Java* with the *Hindu* signs of the zodiac engraven upon them; and I discovered at *Talaga* in the district of *Cheribon*, a *Kawi* manuscript in the ancient character, which among many other *Hindu* figures, had the signs of the† *zodiac* distinctly depicted upon it.

The *Hindus* of the oriental islands are not without some knowledge of chronology. The four fabulous eras of *Indian* chronology are known to them under the following names: *Kirta-yoga*, *Treta-yoga*, *Dwapara-yoga* and *Kali-yoga*. The duration of each period is not specified; but that assigned to the whole, differs, in a most remarkable degree, from the account of the *yogas* given by the *Indian* chronolo-

* This catalogue has not been received by the Society.—*Note by the Secretary.*

† This performance appears to be an astronomical treatise. It is written with black and red ink, upon a strong paper, almost resembling parchment. The manuscript consists of several long slips of papers folded *zig-zag*; and each compartment forming a distinct page in the way that I have seen *Burmese* and *Siamese* manuscripts written. This is the only ancient manuscript that has to my knowledge ever been discovered on *Java* by *Europeans*. Of the history of it nothing was known, nor was there any one in that part of the island who could read a syllable of it. It was not the less regarded on that account. The people of the district viewed it with superstitious veneration; and no consideration would induce them to part with it. Money and a valuable Koran were offered in vain. The chief, in whose possession it was, assured me with much simplicity, that the crops would fail, and famine and pestilence assail the land, if the holy relic quitted it.

gifts. The united amount of [illegible] period, according to the commencement of the present era, is no more than [illegible] years. Literally speaking, the account of the [illegible] which we have supplied, we do not pretending to offer any explanation [illegible] the particular discrepancy between [illegible] and the *Indian* [illegible] however they may stand among themselves.

The common eras of the cultivated [illegible] take their rise by their own account from the date of the first introduction of *Hindu*ism among them. This event took place in *Java** 1748 years ago, and in *Bali* five years later. The *Javanese* era is called the era of AJI SAKA. This I suspect, implies a tautology, as it means no more than the era of the prince who instituted the era. The leader of the first *Indian* colony in *Java* was a *Brahman*, named TRITOSTI, who is with reason believed to be alluded to under the title of AJI SAKA; dates are sometimes written in figures, which is generally the case in the different inscriptions found on *Java*: but a practice which I believe to be *Hindu*, that of substituting written images, bearing some analogy to the number intended to be represented, is much more frequent. The whole of the numbers of a particular date are strung together into a verse, in which is generally implied some allusion to the transaction which it records. An example or two will explain this.

The following line commemorates the building of the principal temple at *Brambanan* on *Java*:

LA WANA *sha hanana wan* [illegible]

8 1 2 1

"The room [illegible] *Brahman* held up the western hand." It means to explain that the place was built by *Brahmans*, and the name

* [illegible] *Hindu*ism, [illegible] *Fiji*.

vellous effort which one of them is described as making, probably alludes to the power and labour which the accomplishment of so great an undertaking required. Read inversely, it gives the year 1218.

SIRNA *ilan kirti-nin bumi*.

4 1

in a line which commemorates the destruction of *Majapahit*, the last *Hindu* state of *Java*.

THE verse literally means "Lost, lost is the work of the land." Read inversely it gives the *Javanese* year 1400. The tenor of the verse indicates a feeling of regret for the loss of the city.

To what extent the *Balinese* have imitated the sculpture and architecture of the *Hindus* of western *India*. I have, as already observed, had no opportunity of ascertaining.* But many of the *English* who have visited *Java*, have had ample opportunity of appreciating the skill and extent with which the *Hindus* of that island had imitated these *Indian* arts. A view of the relics on *Java*, it may be said, has excited, though to an inferior degree, the same sentiments of surprise in an *European* which have always been felt at the contemplation of the great monuments of *Hinduism* in *Hindustan*. They display a portion of the same laborious and indefatigable perseverance which characterizes those stupendous relics of *Hindu* art, which have been so often described. (See Note G.)

IN the political institutions of the *Hindus* of the oriental islands may be traced many of those which peculiarly characterize the system of *Hindu* Government. Wherever the *Hindu* religion has made considerable progress in these islands, the hereditary government of a single individual will be invariably found established; where it has not, we see free, but savage communities; and still more frequently elective

* My respectable and amiable friend Colonel MACKENZIE has given a sketch of *Brambanan* in the *Bengal Research*. The word in the *Javanese* language imports "the place of *Brahmans*."

and animal at pleasure. In the *Hindu* state the administration is entrusted to a minister; in the active and [illegible] conducted by a council. With respect to the condition of landed property, I believe I may safely venture to affirm, that, [illegible] particular, it is precisely the same as it now exists in *India*, in those *Hindu* states which have least felt the influence of the *Mahomedan* principles of [illegible]. A right of private property in the soil is recognized with a reservation to the sovereign of a portion of its produce.* Each village forms a little municipal community complete in itself, having its chief, a deputy, a village priest, &c. each entitled to some fixed emolument from the funds of the village. If this were the place, these parallels might be carried a great deal further. A short enumeration of the names and titles of the officers of government, will convince us how closely the oriental Islanders have imitated the *Hindu* [illegible]. *Raja*, a Sovereign prince; *Patah*, a minister; *Adhipa*, a title of nobility; *Nayeka*, a nobleman; *Mantri*, a title of nobility; *Senapati*, a commander in chief, &c.† These, I believe, are pure *Sanskrit* words; and the affinities I have little doubt could easily be increased by any one acquainted with that language.

I have now to offer a few observations on the history of the introduction of *Hinduism* into the oriental Islands. The information which I have been able to collect respecting this singular occurrence, will be found more precise and extensive, than might at first view be expected, and it may seem unaccountable, [illegible] of [illegible] ignorance, and so well known to the natives [illegible] to them,

* The principal on which the land is allotted [illegible] Rajah's share of the land [illegible] justice, reconciling and assimilating the interests [illegible] by the [illegible] tution, considered the proprietors of all the water [illegible] tries, [illegible] only be termed the [illegible] struggle [illegible] pay [illegible] proportion to the family he [illegible] quasi by he [illegible] It is the interest [illegible] in regard to [illegible] and to [illegible] the [illegible].

† *Adhipati*, *Rajah* [illegible], *Patah* a minister or lord, *Adhipati* a governor, *Nayeka* [illegible], *Mantri* a minister [illegible] *Senapati* [illegible] by the Sanskrit.

when *European* influence has been established over the very people possessed of this valuable knowledge, for more than two centuries.

I MAY begin by observing, that the precept of the *Hindu* religion, which interdicts the natives of *India* from quitting their native country, and attempting voyages by sea, is no better observed than the law of *China*, which prohibits emigration. In the very country whose history we are now considering we see both every day violated. *Hindus* from the *Coromandel* coast (always the source of emigration to these islands) come every year to seek their fortune in the *Malay* countries; and I have seen a colony of these settled at *Malacca*, who have for generations preserved the features, the language and religion, of their ancestors. This is enough to set at rest the question of the practicability of *Hindu* emigration.

KLING or *Kalinga* is universally considered by the oriental islanders as the country from which the civility, laws and religion of *India* were introduced among them; and *Java* as the country which first acquired the arts of *India*, and from which they were disseminated among the surrounding tribes. The natural advantages of *Java* would seem to have determined the *Indian* adventurers to this preference. The narrow shape renders the whole of it, unlike the other great islands, easily accessible: but above all, its preeminent fertility appears to have fixed their choice. In proof of this latter conjecture I would observe that the western portion of the island, though lying nearest the route from *India*, being in point of fertility far beneath the eastern and central parts, seems to have been entirely neglected by the *Indian* colonists. There, there is hardly a vestige of *Hinduism*, neither temple nor inscription; and the language of the *Sundas* does not like

* This opinion is predicted with much sagacity by a writer in the *Edinburgh* Review, vol. XVI, page 193.

ginned to think that the emigrants who took refuge on *Java*, constituted a branch of the general emigration of the followers of BUDDHA, who spread their religion among the population of *Asia*, *Siam*, *Japan*, *China*, and other eastern countries.

Tradition indeed gives no account of the particular tenets of the first adventurers to *Java*. In the course of ages perhaps no great difference remained between the two sects, except what was merely doctrinal. Under those circumstances, posterity might forget the particular tenets of the early colonists. That no hostility subsisted between the later times may be strongly presumed. I shall adduce one proof only. In the great *Buddhist* temple already described in a note, there is not a single image of the worships of SIVA or VISHNU, nor even any figure which I could identify with them; yet within a mile of it, there are two small ones evidently consecrated to the orthodox religion, as might be seen by their decorations: a fine statue of BRAHMA upwards of seven feet high was discovered by us near the ruins of one of them.

The sons of TRITUSTI and their descendants, are said to have succeeded him in the government of his colony down to the first century of the *Javanese* era. In the year 417, the principal sovereign of the island claimed his descent from the first adventurer. If therefore *Buddhism* was the religion of the first settlers, it is probable it was the prevailing one down to that period.

From the arrival of the first settlers down to the year 900, a crowd of colonists and adventurers continued to come to *Java*, from which circumstance the inference I should draw, is that the same cause continued to impel them to emigrate, or in other words, that the persecution of the followers of BUDDHA in *India*, continued down to this period. The date of the arrival of the principal adventurers is fixed as follows:

SRI PRAWATA, in the year	100.
GOVANA, in	200.
SOWILA, in	310.
HOTANA, in	331.
TRISEL, and his son * DASA BANU, in	350

About the year 350, the emigrations seem to have become much less frequent. The animosity of religious persecution had probably now ceased.

The connection with *India* was however by no means interrupted. Adventurers continued to arrive from time to time, and Indian princes are occasionally described as visiting *Kalinga* down to the conquest of † MAJAPAHIT on the *Javanese* year 1400.

In the year 450, a number of *Pandits* are stated to have come to the island, bringing doctrines unknown to those who had come before them. The chief of these was DARIYARI KUMEANA. Their opinions being obnoxious to the people, they were maltreated and expelled from different native states, till they at last found refuge with SRI JEANA, the principal sovereign of the island, who made their chief his *Guru*, implying no doubt that he had embraced his opinions. Does this circumstance mark the first arrival of the worshippers of SIVA?

A few years previous to the *Mahomedan* conversion of the *Javanese*, a number of *Brahmens* of the sect of SIVA, arrived on Java, and received protection from PRAWIJAYA, the last sovereign of *Majapahit*

* The place in the capital which was called *Pajetan*, after the city of the *Pandas* [illegible] chiefs from [illegible] the prince of [illegible] called himself Raja of [illegible] The [illegible] of Java resided like all other leaders [illegible] the [illegible] [illegible] This [illegible] of the original [illegible] of the *Pandas* which [illegible] in Java. [illegible]

† *Majapahit* is a corrupt of the place where [illegible] the *Mayas* [illegible] the name of their settling [illegible]

Bali. On the overthrow of that sect, they fled to *Bali*, under their leader WAHU-RAHE, whose name is held in great veneration by the *Balinese*, who consider him no less than their apostle. The present *Brahmans of Bali* informed me that they were the lineal descent from WAHU-RAHE and his companions. Except this I know nothing of the particular history of the introduction of *Hinduism* into that island. The æra of *Bali*, however, is said to take its rise like that of *Java* from the arrival of the first *Indian* colony. It dates five years later than the latter; a circumstance which, when, we consider the greater distance of the country, seems to give the supposition an air of probability.

THE *Indian* adventurers, who came to *Java* without fighting or combating, settled in various and distant parts of the island, where they founded independent states. The influence and power which they acquired seems not to have been gained by force or conquest, but to have been the result of art and persuasion, exercised through the medium of religion over the minds of a simple and credulous people; in a word the natural conquest which knowledge skilfully or artfully applied gains over simplicity and ignorance. That the natives were not compelled by conquest to adopt the *Hindu* religion, is, I think, fully proved by a fact generally admitted, that the *Indians* have not introduced into the languages of these islands any portion of their own vernacular dialects, while from the language of religion, literature and science, that is from the *Sanscrit*, there has been a copious influx. In the comparative ignorance of navigation, which has always characterized the *Asiatics*, it may indeed be deemed next to impossible that any *Indian* state should possess the skill or means to fit out a fleet or armament adequate to a distant voyage; or fit to accomplish the settlement or conquest of a great country. If we consider the first emigrants as persecuted refugees, we shall be still more firmly of this opinion.

For [illegible] of the new converts would be to acquire the language of the people, as the best means of recommending themselves, and the only means of propagating their opinions. When they came to instruct their new disciples in religious duties, their instruction would be delivered in the language of the country, into which they would find it necessary to introduce such words as were necessary to explain the new ideas which they wished to communicate. In communicating a knowledge of arts and sciences, the same course would be pursued, and hence the influx of a new class of ideas. But in what language is it probable that the *Brahmans* would borrow the terms? not, I imagine, from the vernacular dialects of their own country, but from the *Sanscrit*, the common language of literature, of religion, and of science, wherever the *Hindu* religion prevails. On this subject I venture with much diffidence to differ from the opinion of such a writer as Mr. MARSDEN. The extensive influence of the Brahmans upon the minds of the oriental islands, he is decidedly inclined to ascribe to conquest, and long continued domination, a supposition which appears to me incompatible with the facts which we have on this subject. By forming such a conjecture, we should be compelled to believe, that the vernacular language of the supposed conquerors was pure *Sanscrit*; an hypothesis inconsistent, at least, with the existence of a people, of whom *Sanscrit* was the living language, there is no uniform record.

Conquest and colonization, with the intermixture of the conquered country, have never failed to introduce a great portion of the vernacular language into the conquerors, and frequently have completely altered the original language of both parties, to the exclusion of a third.

One of Mr. MARSDEN's arguments is drawn from the comparison of the primitive and simple character of the class of ideas, to which

Sanscrit words [illegible] adopted. Many of the inhabitants of these islands were [illegible] in a barbarous state before they became acquainted with the *Hindus* of *India*, and must have wanted for so many ideas which a further improvement has made familiar to them. Such they accordingly borrowed from the *Sanscrit*; but the paucity and the meagreness of the radical portion of their own languages in general, is by no means such as to convince us, that their condition in society was extremely low and degraded previous to the improvement for which they are indebted to the *Hindus*.

The *Javanese*, though acquainted with the *Sanscrit* numerals, have a class of numerals of their own; nay, a double class suitable to the rank of the speaker. With these they count as far as a thousand, after which they reckon by the *Sanscrit* numerals, as far as a hundred millions. The *Malays* does the same thing without going so far; this affords an example of the manner in which the native languages have borrowed from the *Sanscrit*. Words, implying considerable abstraction indeed are generally borrowed from the *Sanscrit*, such as terms of science, with the language of Theology, and the names of arts, implements, and productions, in the use of which the inhabitants of these islands have been instructed by the *Hindus*. Such words as express those ordinary feelings, and social relations common to our species as abstracted from those resulting from peculiarity of manners and customs, and from the knowledge of the arts of civilized life, will in general be found to be expressed by native words. That such words are often expressed by *Sanscrit* words is fully admitted, but I am mistaken, if it is from a [illegible] for rhymes, are wanting for the same words in their language; or in all others, a foreign term is often preferred to a native one, for which no reason can be alleged unless the whim of fashion and the love of innovation be admitted as such. Sometimes the native term becomes obsolete, and once becoming

obsolete, it is no difficult matter to conceive, that it may [illegible] altogether forgotten. In the *Javanese* language [illegible] that for all the examples given by Mr. Marsden, native synonymes, and generally more than one, may easily be supposed. The radical portion of the *Malay*, however, evidently shews itself the language of a people far below what the *Javanese* appear to have been previous to the *Hindu* conversion of both, if I may be allowed such an expression.

The scanty idiom of a race of naked Savages as the *Malays* most probably were, may well be supposed to have wanted such terms as Mr. Marsden has adduced as examples, more particularly, as some of them, such as *loyalty*, *prudence*, *time* and *cause*, evidently imply considerable efforts of abstraction, if one advert to the probable state of society in which they were ingrafted upon the first scanty idiom of the *Malays*.

All I intend by these observations is to point out the weakness and fallacy of any reasoning formed upon such imperfect and limited data as those with which Mr. Marsden was furnished; and it is far from my wish to reflect on that cautious and accurate observer, whose opinions are already entitled to the greatest attention and consideration.

Conscious of my inability to do justice to the subject, I willingly drop this dissertation, which the nature of the subject has almost insensibly led me, and kindly clothed by myself, submit it to the discrimination and learning of the Asiatic Society, who, I am fully satisfied, will do ample justice to the subject, which I have indeed meant to attempt this popular view of the state of the *Hindu* religion on *Bali*, and of its first introduction into the oriental islands. (See Note B.)

Sourabaya, Island of Java.

NOTES.

A.—The [illegible] portion of [illegible] is also contained in the *Kawi* [illegible] same with [illegible] *Jawa* or *Jaut*, (both are equally correct, the one belonging to the common language, the [illegible] the language of deference and respect, used by inferiors,) and *Kawi* [illegible] *Wawan* [illegible] relative terms; the one expressing the language of the learned, and the other the vulgar tongue. When a work is translated from the former it is said to be made *Jawa* [illegible] of (*Kawi*) [illegible] to mean translation or explanation in general. It is exactly similar in our own expressions [illegible] English of [illegible] The *Malays*, whose literature is borrowed from the *Arabs*, but above all from the *Javanese*, use it for translation in general, [illegible] to its first meaning. In proof of this explanation it may be observed that the term [illegible] only applied to the written language, the whole or almost the whole of which is [illegible] stations. That excellent and accurate writer, Mr. [illegible], is much at a loss to make out the derivation of this word. I hope the accounts now given will appear satisfactory to the [illegible] and [illegible] with every thing connected with these countries is far more accurate and extensive, than that of any other individual.

B.—Were I to offer an opinion respecting the history of the *Kawi* I would say that it is entirely deprived of its inflections and having in their place the prepositions and auxiliary verbs of the vernacular dialect of *Jawa*. We may readily suppose that the *Brahmans* of that island separated from the country of their ancestors through exclusiveness and the pure endeavouring to get rid of the difficult and complex inflections of the *Sanscrit*, for the same reason that the barbarians altered the *Greek* and *Latin* languages to the formation of the modern *Romic* and *Italian*. In proof of this it seems probable that a number of words of the form other than, besides the prepositions and auxiliary verbs, would creep in, and [illegible] corruption [illegible] universally accounted for [illegible] of the *Kawi* more or less modern or otherwise already mentioned. The *Kawi* was probably always a dead language, or if spoken, a language confined to the priesthood.

C.—The most remarkable of these monuments are the temples of [illegible] said to have been [illegible] *Boro Buddha* built in 850, and *Brambanan* or *Prambanan*, part of which was [illegible] 12[illegible] and part in 1388 [illegible] *Buddhist* temple, and in my opinion the most remarkable relic of *Hindoism* on the island. I [illegible] these buildings, consisting of seven ranges of wall, each range [illegible] the building terminated in a kind of dome. It occupies the [illegible] of a small hill which is [illegible] to receive the walls, and to accommodate itself to the figure of the [illegible] The walls, both inside and out, are decorated with a profusion of [illegible] and an opinion of the size of the whole building may be formed from the number of statues of Doorga which it contains. These are [illegible] for them in the wall, [illegible] to 370; most of them each in Doorga is represented in a standing position, more than [illegible] feet high, [illegible] attitude. The [illegible] in the district of [illegible] and the choice of the site does credit to the taste of the builders. The country is [illegible] fertile and highly cultivated, [illegible] the hills which are covered with lofty trees. Two beautiful streams run at no great distance from the hill, which is [illegible] by the temples. Upon the whole, a more picturesque or beautiful spot could not have been selected. It may be here fairly observed that the *Brahmans* have made choice of the finest portions of this country for the site of their temples.

NOTE.

I owe to the learning of Nata Madja, a prince of Sumatra, [illegible] well known [illegible] in this part of the world for his merit and modesty, the [illegible] portion of the ancient history and literature of these islands, contained in the [illegible] Nagara. He is the regular merit of being the only native in our possession, who understands the ancient character in which the Kawi is written, or who has made any proficiency in the knowledge of that language itself. Kawi reading has been hereditary in the family of Nata Madja for 80 years, one of his ancestors having been instructed in it, by a refugee from Java, long after it had been totally extinct in Java.

Extract from the Brata Yudha *or* Kawi Mahabharat, *describing a nocturnal combat between* KARNA *and* GATOTKACHA.

[illegible] Gatotkacha [illegible] Karna
Thus the Falcon [illegible] or majestic [illegible]
[illegible] ojarau wayang [illegible] gadha [illegible]
[illegible] bagya yen [illegible] [illegible]

[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
Kunan apa [illegible] gati bagya [illegible]
Si [illegible] [illegible]

[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

Irika tuwah ri alambana lawan bala raksasaik
Wkasni Jatasura mati thap nira Bimasata
Yata kapasut datan sabala raksasa nira tara
Patamoda rakola ya pwa puda raksasa rudra janma

Irika kala ikapna kan Halambana tan duwa piah
Thapira ma Gatotkacha mamaka ri tangan ika
Ginutukbakan siranoja ri surjodana kayat hawu
Ku-ya-ta thanal ni warga mu wawqsaira Bimasata

Apuli hariala wera sao simbo mas manika
Maka gurilap trisula nika ikana mawarna adan
Datan lolwoh thapnira Gatotkacha sura tara
Kasna tinkal gulu nira mawah ya binondhan hakan

Mowa hamasoh Halayada lawan Kalasa rurank
Agalaka lina ne bapa ikap nira Bayusta
Pwa-ni pjah lo maha Kalasa Hidima ri paripu
Karana nika wayan kanika tanda mawah ya pjah

Wawan namahsoh hikan Kalasa rangti wasarda wagum
Ika namale rawan wka san Arjuna lan nulupay
Yata ika sabasa maka sumoa lawan Kilima
Kasna mati de Gatotkacha di Kurukshetra pang

Ri pjahi kan Duratmaka palan ulki tan pabiya
Mawa hamasoh san Angapati ma pasala gunalan
Amapag kan panuk prawara Bimasata dnya
Prasama magantoran pada wisesa tanagtra nira

Dana sawor bala nropati karana marad dakakna
Binara hawas hawas tkap-ikan bala raksasa sak
Kadi Gaja na deka malali ri ya masoh hagalak
Hanggha pjah pjah kanalaya gnala tinwja

[illegible]

Kinjawan madyane ambare [illegible]

Tawang ya mustika [illegible] kaliyan [illegible] [illegible] papuji

Sakeh [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] kaben

Du yasan pinarab [illegible] Rawipati brahmastra [illegible] [illegible]

Bumi bata gan [illegible] kanan [illegible] [illegible] [illegible] [illegible]

Pagat [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] krakuwasal [illegible] [illegible] [illegible] [illegible] [illegible]

Kepran tan Rawipati [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Ne[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Tandya [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

TRANSLATION.

Parta and Kresna, confident in the valour of Gatotkacha, [illegible] [illegible] to meet Karna in battle. The son of Prita rejoiced at the [illegible] and deemed himself [illegible] [illegible] commands. "Whoever, replied he, [illegible] life be preserved, or the body be crushed to atoms in the field of [illegible], your injunctions shall be obeyed." When Kresna and [illegible] heard these words [illegible] King of Pandawa, they [illegible] with surprize and [illegible] [illegible] in admiration of his skill, [illegible] the affections of his seniority, and of the gallantry which prompted him, yet a youth, to meet the experienced Karna in battle. Kresna was touched with compassion for the youth, and would [illegible] have represented his ardour, and [illegible] combat; but the [illegible] [illegible] could not be dissuaded, and advanced to meet the King of Angga; yet not without some [illegible] of his strength. He carried with him the [illegible] weapons, [illegible] [illegible] to be conquered.

[illegible] from his hands, [illegible] and rushed upon his foe. [illegible] and retreating, endeavoured to place himself in a more favorable position. Now the [illegible] of the sons of PANDU were brought forth, and [illegible] with increasing splendour. There was [illegible], the son of GANDURA, whose name was LAMBAN.—[illegible], the father, had been slain by the hands of GIRES. LAMBAN was attended by an hideous army of *Butas*, who rushed upon the forces of GAYOTKACHA—*Butas* [illegible]. The conflict was mortal and the battle raged; demon contending against demon. LAMBAN himself encountering the King of *Purbaya*, was defeated and slain. The conqueror covering [illegible] from the body, took the former and threw it in the direction of *Suyudana*, exclaiming, "O Duryodana, here is the head of your relation." Soon the brother of LAMBAWA, whose name was LAMBU-SARKA, prepared to take revenge and discharged a flight of *Triskies*, which numerous as rain fell upon his adversaries; but the son of PANDU was not to be dismayed. He opposed the host of adverse *Butas*, and at length seeing upon their leader, he divided his head from his body and dashed it from him. Then advanced to battle on his demons the chief KALA-YUDA. He stormed with rage, still [illegible] of the death of his father.—His father KIRDIKA, an innocent victim, who had fallen by the hands of BIMA. GAYOTKACHA soon put KALA YUDA to the sword. Then, another *Buta* showing [illegible] into the battle, his name was KALA-SRANGI, in person of perfect beauty. BARBAR URAWAN, the son of ARJUNA, and DAWI PRATIPUI, had fallen before his hands. He joined the combatants without delay, and [illegible] from the King of *Purbaya*, who now routed the hostile demons in [illegible], so that none remain to offer further resistance. KARNA alone encountered the son of [illegible] and continued the battle—They contended with [illegible] weapons.—The dying forces of [illegible] were succoured by the HARDSAP of GAYOTKACHA as he [illegible] elephant pursued the [illegible]—Such of the forces of the KURAWAS were taken prisoners, [illegible] for [illegible] dispatched. The fugitives could not be rallied, for the groans of the wounded and the [illegible] of the feet of the remaining appalled the rest. Close pursued by the *Pandas*, the *Kurawas* were dispersed in every direction. Even more [illegible] terrified, they extinguished their torches for security. But [illegible] the *Pandas* blazed forth, and they added to their own those dropped by the fugitives. The torches of the victors seemed [illegible] If they would set the universe on fire, and [illegible] their enemies in the flames.—[illegible] A descend by his army returned with [illegible] charged the son of [illegible] his, slew his driver, and disabled his horses.—The son of [illegible] flew into an [illegible], and [illegible] himself to the white cloud, no longer touched the [illegible] earth. [illegible] he had disappeared, [illegible] attack [illegible] demons continued, he discharged his countless darts, hardly knowing which [illegible] downwards, some to the right [illegible], some to the left [illegible], the front, and some to the rear—[illegible] an hideous attack and in [illegible] expectation of his [illegible] he [illegible] to work on the [illegible]—At length KARNA heard the voice of the King of *Purbaya* from the clouds warning him to prepare himself.—As he descended, the sound grew louder and [illegible] like a peal of thunder [illegible] to the field of battle.—The King of *Amanga* knew the sound, and calling aloud to the [illegible] challenged him to descend on the stable earth and meet the GAYOTKACHA in the midst of the [illegible]

increased his stature and magnified his bulk like the God KALARAKA of this the universe.—Be so, he raised his voice with a shout which seemed to rend the circle. His aspect was terrible as that of RUDRA, threatening to crumble the world to atoms. He bent his bow and unslung a fiery arrow which destroyed the foe.—Again he increased his stature—bade defiance to his foe, and advancing upon him, almost had severed his head from his body. Sakuni, whose weapons were of no avail, fell a victim for the situation would to himself, "I am doomed to fall by the hands of the son of Bima."—Accordingly he had recourse to the divine weapon *Lanta*. He discharged the [illegible] at the son of Bima, which entering his breast, transfixed his body.—The wound arrested the progress of the warrior; but recovering himself for a moment, he again advanced upon his foe, resolving to shield perish with him. The descendant of the Sun eluded the blow by leaping from his [illegible], and the King of *Prabaga* seizing upon the driver, dragged him along with him to the regions of the dead.—SURYODANA and the KORAWA rejoicing at what they beheld, set up a shout of exultation—not so the chiefs of the *Pandu* army; they turned pale at the sight, and with great all [illegible] under.

NOTE BY THE SECRETARY.

The Episode given above, by the author of the preceding paper, agrees generally with the same as it is narrated in the original *Mahabharata* ascribed to VYASA, but it differs from that narrative in so many respects, that it can scarcely be called even a paraphrase of the *Sanscrit* Poem. It is more probably a translation of some other work of similar name and subject in the Jalanlal *Bharata* [illegible], which I am told is well known in the south of *India*, or it has been translated from a version into one of the local dialects, most of which possess a translation or paraphrase of the *Mahabharata*. A slight description of the original will tend to corroborate the suggestion.

The combat between the Pandava, GHATOTCACHA, and the Prince CARNA, in the course of a nocturnal engagement between the *Pandava* and *Courava* armies, is related in the *Drona Parba*, or the seventh canto of the *Mahabharata*; the description is however much more detailed than in the *Cawi* poem, and extends through upwards of 248 stanzas. Agreeably with the general style of the *Sanscrit* poem, the story is thrown more into a dramatic or incidental form than appears to be adopted in the *Cawi* poem. The name of this hero is CARNA; he has conducted great havoc amongst the *Pandava* forces, and at the head of a portion of *Duryodhana's* army, on the point of gaining a decisive victory—when GHATOTCACHA is instigated by CRISHNA to endeavour to arrest his progress. The imploring beat given thereby CRISHNA is repeated by ARJUNA, and the *Pandava* proceeds to the encounter, exulting and confident of success. The [illegible] combat, its issue and attempt to repress his ardour, do not occur in the original. GHATOTCACHA is not opposed by the son of DURYODHANA, named in the *Cawi* indifferently ARJUNA-MALA or JAYAVANA; the name, stature and character of the enemy are similarly described in both works, and GHATOTCACHA having defeated and decapitated this, presents his head, as described

[illegible] to Sudhanwa, [illegible] the same person who is Dhanvantari, the god of the [illegible]. In the *Sanjaya*, Gratodgacha [illegible] the Prince in nearly the same words as in the *Gita*, and the commencement of Sudhanwa's battle is the only one in which I have been able to discover a close approximation. "Hence, your relation of the conversation of me you have heard—I shall soon return to you with the head of Karna." [illegible] to Krishna, [illegible] a well-known law in Pandia, princes and women are not to be approached without a present, the [illegible] in this case therefore being limited to the best three or four words. Gratodgacha [illegible] forward to encounter Karna, and a furious battle ensues between them and their forces under their command. Karna begins to waver, when a second *Rakshasa*, named in one of [illegible] Ayavudha, rushes [illegible] Ayavudha comes to the assistance, burning for revenge upon Bhima, the father of Gratodgacha who had formerly slain Baka, Kirmira, and Hidimba, kindred Rakshasas, and carried off Hidimba, the daughter of the latter. Ayavudha is forced at a disadvantage by Bhima, and the *Pandava* Prince hasten to his aid, but the demon still prevailing, Krishna directs Gratodgacha to desist from following up his advantage against Karna, and to relieve the Prince contending with his fellow-kind. The disposition of the fight is accordingly changed and the two *Rakshasas* encounter each other while Karna is opposed by his Pandava brethren. None of which incidents are noticed in the translation of the *Gita* composition. Ayavudha is slain by Gratodgacha who then renews his attack upon Karna—after a considerable portion of tumult and havock, and a plentiful expenditure of ammunition both human and divine, the conflict terminates in the death of Karna, in a manner which the same is described above—a compressed translation of this part of the poem, for it is impossible to do justice to the prolixity and [illegible] of the original, will perhaps be considered as the most [illegible] of the [illegible] of the *Sanjaya* and *Gita* poems, and I have [illegible]

TRANSLATION

Sanjaya.—When Gratodgacha found that Karna maintained the contest and [illegible] he armed himself with a mighty shaft and hurling it at the horses and [illegible] of the Prince, [illegible] and instantly vanished into the air.

Dhritarashtra.—Tell me then Sanjaya what befel my children contending with so [illegible] a foe.

Sanjaya.—The disappearance of the Rakshasa filled all the troops of Karna with dismay, and they despaired of their valiant champion, exposed to combat with an invisible enemy; but the [illegible] fled in fight, scattered with prompt and unwonted fear, his countless and pervading arrows—the [illegible] the heavens or the wave—with a cloud and spread such impenetrable gloom that Gratodgacha no longer beheld the armament of the Prince. Then, oh monarch! we saw in the sky a mighty mirror of crowded and infinite forms glowing with red and fiery splendour, and darting [illegible] together

[illegible] still lightning around. The [illegible] and [illegible] mingled [illegible] increasing shower of arrows, darts, [illegible] and [illegible] with a hundred yelling, scorching rockets, [illegible], loud crashing thunderbolts, and discharges with a hundred [illegible] whistled along. The shafts of Cassia encountered the storm of rain, and thus [illegible] of deluge-elephants and horses, [illegible] and the groans of men. The troops of Duryodhana stood appalled on the right; their ranks [illegible] within them, and disorder spread through [illegible], but awe of Dronacharya [illegible] their [illegible], and the bravest combatants [illegible].

The shower of weapons still continued, and the broken ranks were [illegible] by howling Jackals [illegible] to prey upon our fallen [illegible]—then rushed forward a [illegible] of fiends with weapons of fire and [illegible] and [illegible] like something they [illegible] along, and as they advanced they overwhelmed the army with a [illegible] of mighty and destructive weapons. Horses, elephants and chariots [illegible] beneath the burden, and the bravest [illegible] and turn [illegible] their [illegible]. The Gandharvas [illegible], exclaiming: "[illegible] and the Gods fight for our foes."

[illegible] the general confusion that friends and [illegible] knew not each other, and the sons of Duryodhana and Pandava, mingled terrified [illegible] indiscriminately together. Dread was the darkness—the four quarters of the world were [illegible] and the [illegible] only that of the [illegible] illumined the scene. Then Lakshmi Cassia [illegible] and [illegible] specially [illegible] of supernatural weapons [illegible] and scorching the mighty shafts of [illegible] and the dead. Burning with shame at the prospect of defeat, and prepared [illegible] with [illegible] the overthrow of fate. The [illegible] of *Sindhu* and *Vahika* [illegible] the [illegible] of the Rakshasas. The [illegible] continued [illegible] discharge [illegible] with discovery, which [illegible] of Cassia's [illegible]. The Gandharva [illegible] lies on the ground and exposed to [illegible] thought the moment arrived when he should have recourse to the weapon that could alone triumph over such supernatural and [illegible].

Then he therefore addressed him, "Destroy, on Cassia! [illegible] with the fatal shaft, or the race of Gandharva [illegible]. What fear [illegible] of Indra or [illegible], that the Rakshasas should not be slain. If we escape not, Cassia will still lead us to victory against the sons of Cassia: kill him with the shaft, Slayer of *Indra*. Save your allies before this infernal night shall further be prolonged. Every hour it lasts our mortal vigour moves, while the Rakshasa derives new strength and power from its duration."

He no sooner heard the general cry of the *Gandharvas*, Cassia consented to quit the mighty weapon. Horse and eagle, elephant and lion, he resolved to end the conflict at a blow, and sent with the dart *Vijayanti*, the-

[illegible] Long he reserved the beautiful and splendid [illegible] the gift of Indra, in exchange for the bracelets and [illegible] of his birth, and created [illegible] of Arjuna. Fleet was the strong-girt arrow in its flight, terrible like the roar of a wild [illegible], and fatal as the sister of death. When Karna raised he weapon the firmament [illegible] as for those only as the Himalaya mountains prepared to fly. Karna raised it with both his hands, the [illegible] roared, the winds roared and [illegible] shook the heavens. The arrow rushed [illegible] the Pandavas to [illegible], and piercing the breast of Ghatotkacha forced a passage through his body, and then winging its glittering course aloft, took its place amongst the constellations with battered crest and mangled [illegible], darkling as a cloud or mountain, precipitous the monster fell; but ere he reached the ground he made a last exploding effort for his Pandava allies, and expanding his enormous bulk he covered, and crushed in his descent a division of our forces, thus faithful to his friends even in his death. Then shouted our chiefs and the drums and clarions echoed the sound. The *Gandharvas* hastened to behold their champion, and Karna was hailed by our host as was Indra by the *Marutas* on his victory over Vritrasura. Then they brought your son in triumph to the field rejoicing in the fall of his foes. The Pandavas witnessing Ghatotkacha like a fallen mountain prostrate on the earth were filled with sorrow and dismay, and their eyes were suffused with tears.

THE

NARRATIVE OF A JOURNEY

TO THE

Sources of the Jumna and Bhagirathi Rivers.

BY JAMES B. FRASER,

Author of the Journey to the Himalaya, &c.

On my return from my journey to the sources of the Ganges, we proceeded, by the direct road to *Gangotri*, we pursued the course of the young Bhagirathi (the river) where for some days we were in great expectation of information. And on having arrived at the snowy mountains, we found *Mori-Ca-Gunda* range, and turning our course down the valley of *Jamnotri*, we reached the sources of the river *Jamna*, and encamped on the northern bank of the fort of *Raingerh*, where for some days we were detained by the difficulty of procuring a passage for our baggage. We then proceeded to the town of *Sirinagar*, the city of Jolah, on the left *Raingerh*, and kept down

* William Fraser, Esq. [illegible]

† *Sirinagar* is situated [illegible] upon the mountain side.

‡ *Moral Ca Gunda* [illegible] and [illegible] and under various names, from [illegible] an interesting range, because it is that which [illegible] eastern side, flowing through the *Girri*, *Tons*, *Pamir* and [illegible] and [illegible] of [illegible] while those from the western aspect, run [illegible] and [illegible] and the [illegible]

ward along the course of the *Pabar* till its junction with the *Tonse*, and then followed that river, crossing it by a bridge of ropes, nearly to the spot where it is met by the *Loha Gurdi* range, which we crossed considerably to the northward of its stream, and on the 9th July we reached the village *Cotha*, situated on the right bank of the river *Jumna* about 2 miles above its bed. The fort of * *Jaunigerh* is not far distant on the opposite side, and the road to *Sirinagar* crosses the river a little way below the village.

As I had much anxiety to visit *Jumnotri* and *Gangotri*, the sources of the rivers *Jumna* and *Ganges* (or rather of the *Bhagirathi*, the principal sacred source of the Ganges) places of peculiar sanctity to the *Hindus*; I profited by an opportunity better than could ever again occur, and parting from my brother, who pursued his way to *Sirinagar*, took, with as few attendants as was consistent with prudence and necessary comfort, the road which leads to the first mentioned place.

10*th July*.—Left † *Cotha* past 9 o'clock, the road winding in a general direction to N. E., following the deep indentings of the ravines and valleys, that furrow the mountain side and pour their streams into the *Jumna*, which winds far below; sometimes it is varied by sharp ascents and descents, but keeps nearly on a level till we reach a pass or gorge, named *Chamri-Ki-Dhar*, the end of a lofty range that coming in a westward direction continuous from *Burushi-Ki-Dhar*, ends in the *Jumna*. On our way to this point we passed through one or two villages, but the cultivation is neither extensive nor promising. From this station an extensive view would have been obtained including *Birat*, *Badray*, and several of the hills above the *Dehra Dun*, as well as the extensive

* *Jaunigerh* is the place to which BRIGADIER SIKE retreated after the evacuation of *Kalunga*, and from whence Major BALLOCH was dispatched by him.

† From *Cotha*, we had bearings of *Jaunigerh*, *Birat* and *Badray*.

range, on which *Jantruch* is situated, [illegible] general [illegible] of the course of the *Jumna*. From the snow, [illegible] to *Cu*[illegible] was prevented by a thick fog which [illegible] the [illegible] and only now and then [illegible] to view a peak [illegible] through mist. From hence we entered on a very [illegible] [illegible] of a small but rapid stream [illegible] *Ca*[illegible]. The valley or hollow of which [illegible] is singularly formed by the meeting of two hills, [illegible] by a small ridge, [illegible] distance from the river; and the [illegible] narrow [illegible] over [illegible] considerable quantity of [illegible] cultivation, wheat, barley, [illegible] cotton, and a [illegible] *Chi*[illegible] trembling bird-seed, feather [illegible] through it; the rice [illegible] other part of the vale is neatly cultivated on levelled ridges, over which water is led in small courses, taken from the stream far above. It is a wild and rugged ravine, and [illegible] very [illegible] to their height.

The descent from *Church-Ca-Ghat* is very irregular and zig-zag, [illegible] and [illegible]; passing through *Cotbah*, a village [illegible] by the *Gorkhas*, we crossed the *Gothna* rallah, and reached the village of *Kotha Middal*, situated [illegible] off on the banks of [illegible]. This village is claimed both by *Serahe* and *Sirmor*; it cultivates [illegible] of [illegible] state, and pays tribute to both; it seems entirely appropriated to the maintenance of several temples, and their priests; and there are some fine rich pieces of land on the banks of the *Jumna*, as well as of a rallah, a short way further on, set aside for this [illegible] purpose, for which the village is assessed by each state. There is a great temple to SIVA, a place of worship to the five brothers, BIRM SE[illegible] JOR, YODHISHTHIR, SI[illegible] DEO, NACULA, known by the name of the *Pandaven*, a temple to *Bairam*, one to *Parasuram*, and a [illegible] to MAHA DEO, under the name of

* *Panicum miliaceum.*

Cedar, with some curiously carved stones representing the *Hindu* deities; two figures in stone representing ARJUN and BHIMSEN, are remarkably well executed, but their faces have been defaced, it is said, by the *Rohillas*, in an incursion of old into the hills. One curious stone represents in relief a large assemblage of *Hindu* divinities, among whom GANESA, DURGA, BHAVANI &c. &c. were readily recognised. A narrow cavern leading under ground through the rock from the village to the river side, used, it is said, by the people of the country in times of danger, was shewn us, but we did not explore it.

OPPOSITE to this village, *Barni-Ci-Gad'h*, a large stream which has its rise in the lofty peak of *Bongi-Ca-Tiba* debouches into the *Jumna*. In the *Ravine* we observed a curiously situated house, or fort, built upon a small rocky eminence, quite insulated in the middle of the stream. Its name was *Biraltu*, and it belonged to a zemindar of some consequence, BHU'V SINH.

OUR route now lay along some table land just on the river bank: passing *Bandergerri*, a ruined fort on a small rising ground above the road, we descended to *Necral-Ci-Gad'h*, which stream is said to be the boundary between *Gerwhal* and *Sirmor*; but there appears to be a fort of land debateable around *Lakha-mandal*, which contains some spots of land, far richer than that generally met within the hills. *Necral-Ci-Gad'h* is very considerable, and is said to take its rise in *T'hiran-Ca-Tiba*, nearly two days journey to the N. W.; its immediate banks are rocky and wooded, and much fine alder wood grows on them, as well as on those of the *Jumna*.

AFTER a sharp ascent up a bare rocky hill, a rough path along its face brought us to *Banchaun*, a large and apparently populous village, high above the river, and where we rested for the night. The place of

[illegible] given [illegible] square, inclosed with a high wall, contains a temple to *Kaha Deo*, who, in the approach to the sacred places, and the wild snowy peaks, his peculiar residence, is worshipped with almost exclusive devotion; the temple was neat, much in the same style as those usually met with among the hills, with *Chajjas* or hanging roofs, [illegible] carved [illegible] and the doors covered with carved [illegible]. The village has the appearance of having once been more considerable: the chief zemindar or *Seana* (as he is called) when questioned with regard to its population, averred that it had but 28 houses, and could contain about 300 inhabitants; but his answers were hesitating, insincere and prevaricating; and I suspect he believed that the questions put were preparatory to some assessment or tax, which prevented the truth from being told. I should have thought the village must have contained full 400 inhabitants; it is not exactly a part of any purgunnah, but in fact is measured as attached to *Prwaen*.

At 7 o'clock next morning we left *Banchauli*, and proceeded still along the left bank side of the hill above the *Jumna*, following the deep indentings and long rounds of the vallies, with various irregular ascents and descents, till, by a very rough and clambering path, we reached the top of *Ganganee-Ka-Dhar*, in a point called *Ganganee-Ka-Gaul*. This balcony is very highly elevated, and commands both upwards and downwards, a most extensive and noble view, though partially obscured by clouds. From hence we obtained the first distinct view of *Bender Poonch*, the mountain, from a part of which the *Jumna* has its rise; it shews in two grand peaks, both very white in snow, and of great magnitude and height. The bed of the *Jumna* looking downwards, is narrow, deep and rocky, save where the few green spots around *Lakha mandal*, relieve the eye; upwards it runs in a far more fertile country, with table land and cultivation on its banks and several villages; while the hills slope more easily down to the left bank, exp[illegible]

covered with a variety of forest scenery, and spotted with fields. Further up they frown and close, and are [illegible] beyond, and above all *Gorkhatri* towers above the clouds.

[illegible] narrow, [illegible] and unfrequented path through [illegible] further [illegible] pass, where information was given, that a vale of considerable magnitude lay to our left, stretching from the *Jumna* to the westward, and in hopes of seeing so unusual a thing in these rugged hills, we left the road to make the trial. We were however disappointed upon reaching the ridge, whence it was thought it might be seen, nothing appeared, save the lower part of a ravine entirely of the same nature as the rest of the country, and which has here the name of *Sa[illegible] Ok-Gadh*. Above it is called *Rama Serai*, and I obtained only the following particulars descriptive of the place.

The old and ruined fortress called *Sirool*, is situated on a high *Tiba*, of the same name, at the end of the lofty range *Cedar-Canta*, which stretches down from one shoulder of *Bender Pooch*, two or three cos further up in this mountain; the stream, *Rama*, has its source in a spot called *Sieghe*, and is joined by several others from the sides of the hills as well as from *Sirool*, and from the range which forms the other side of the valley, called *Rama Ok-Dhar*. Just at the end of this last mentioned range, which was in view from the point we stood on, the valley of *Rama Serai* commences, and runs up to *Sirool* for a distance of from 5 to 7 cos, probably about 9 miles; the direction judging from that of the mountains, and position of the place we lay, along with their former bearings given, may be nearly N. E. and S. W. The breadth from [illegible] and it is level throughout.

The soil of this valley, which contains one *Pal* or division, was well [illegible], and contained many populous villages, now like the rest of

Gerwhal it has been found to decay, and four half ruined hamlets alone remain; these are *Gundau*, *Sirál*, *Gimrk*, and *Ochar*; the two former are near the head of the plain. The whole forms a part of the [illegible] or *pargana* of *Rewaen*, and had been given by the late *Raja* [illegible]AN S[illegible] to his brother PRITHUM SA[illegible] who lived [illegible] 6 or 7 years in several parts of it; his chief residence, however, was at *Gundau*. The *Raja* himself frequently came here with his brothers to hunt in the valley; they rode upon *Gounds*, or [illegible] hills, which are there abundant.

From the foot of *Sircot* proceeds another stream which rises in a valley named *Gadu-Gadh*, and which, after a course of above 6 miles, joins the *Tonse*, nearly the same distance above *Ashul*. This is also [illegible] a fine level, and formerly well cultivated valley, from ½ to [illegible] miles and half wide; but far inferior to *Rámi Serár*, which seems to be [illegible] the largest and finest in the whole country, excepting the *Dún*, [illegible] have been considered a place of delightful retirement for the [illegible] days of the greatness of *Gerwhál*.

[illegible] the road, and passing through the ruined village of *Ch[illegible]*, we ascended a steep rocky path, very irregular and zig zag, [illegible] the [illegible] of *Sangéri-Gádh*. The mouth, through which the water has forcibly worn its way between opposing rocks [illegible] narrow, and has probably yielded to the force of torrents much sooner than the soil of the rocks behind, which may, in some measure, perhaps, account for the singularly deep nature of *Rámi Serár* valley from those ravines which usually divide the hills. The stream is of the copious [illegible]

THE rock here, as well as that we have to-day crossed, is principally lime stone, very hard, but [illegible] with sand stone. Than

about the village [illegible] *Bandhauli*, and more [illegible] to *Gangaon* [illegible] *Dhar*, is the lime-stone under various shapes, among others, a [illegible] concretion, to all appearance like the singular balls of mortar and gravel found in the walls of old buildings; for [illegible] it was [illegible] hardness and in large masses, at others, as if only forming in [illegible] common and miscellaneous [illegible] are also met with, but a very [illegible] soft clayey earth, [illegible] soapy between the fingers. The [illegible] *Gangaon* [illegible] exhibited a singular appearance; [illegible] denud[illegible] of soil, the [illegible] is cut into strange forms and fissures, [illegible] the [illegible] storms [illegible] a compound of mild and lime-stone, [illegible] where [illegible] of the [illegible] to bind [illegible] in the former, the violence of the [illegible] ther has worn [illegible].

From hence, the road winds pretty constantly along the [illegible] the heat was excessive both in our descent, and in the low grounds [illegible] few miles onwards we passed *Maungra-Gerh*, an old ruin, which stands on a peninsular rock, from 150 to 200 feet high, boldly projecting into the river; it was lately occupied by Dhanjay Chand, [illegible] Singh, and Dahlat Singh, who were the *Rohillas* of the *Raja* [illegible] *Marwhal*. The term *Rohilla*, as far as I could understand, is applied to a son of the *Raja*, born of a slave woman; and this indulgence was entirely appropriated to these connections of the royal family; it appears to have been of considerable extent, but now [illegible] much like the ruined towns of the small *Thakurs* we have seen near [illegible]. It is now however in ruins, having been burnt three years ago by some dissatisfied [illegible]. Just above this place, the ruins of a bridge [illegible] keep up communication with the village near *Maungral-Gerh* [illegible].

[illegible] several villages [illegible] and a *ghat* on the eastern side, [illegible] *Kolla* (ruined) with [illegible] (fine) on the western or right bank, and saw [illegible] several considerable streams

flowing from the [illegible] and *Sucrat* mountains; and crossed *Bénál-Ci-Gádh*, a large stream, which has its rise in *Sarkil-Ca-Tiba*, about seven cos hence.

THERE is a great deal of fine rice cultivation in the lower part of this valley, which is flat and rich; at the time we passed it, the *zemindars*, their women and children, were busily employed in planting rice, and were cheered in their labour by a rude band of singing and dancing men with their instruments; who proceeded forthwith to salute and welcome the strangers. The natives are remarkably partial to this uncouth amusement, and singers and dancers are met with in every village. Here the villagers appeared very numerous, and were particularly savage and wild in their appearance, both men and women laughing like idiots as we passed.

A SHARP ascent up the end of *Dhálu Dhar*, and a short progress along its face brought us to the village of *Dudhéat*, our station for the night. It is neat and of considerable size, and is one of several in this valley that form the chief part of the *Bénál That*. From here too we enjoy a good view up the *Bénál* valley, which, though not very level, is remarkably well cultivated; much rain fell this evening, and our quarters were not the most comfortable.

HERE several * *Gorchá* soldiers joined us, to all appearance in a very wretched state, and solicited service, at all events protection, from the

* It was usual, during the Government of that people, to station parties in the different districts, for the purpose of collecting the revenue; and in progress of time, many of them took daughters of the *zemindars* in marriage, not always with the good will of the latter, but the connexion formed a tie between the conquerors and conquered, which, though far weaker from the savage and treacherous nature of the people, than a similar one in most other countries would have been, was still sufficient during its existence to guarantee life, and prevent the murder of the Son-in-law.

When the power of the *Gorchas* was broken, and their troops were taken prisoners or scattered, those, in the further districts thus connected, chose rather to domesticate with their wives and families, than run the hazard of retreating through a country of hostile savages, ripe for revenge on a tyrannical

violence they dreaded from the natives, should they be left in the hills after the English might quit them; they excused themselves from attending us to *Gangotri*, on the plea of want of arms and cloaths, which we could not supply them with; probably, they were not desirous of a long and fatiguing journey, they therefore were dispatched with a note to my brother at *Sirinagar*, with a few sepoys, in the service of the *Fauj-Dar* of *Rewaen*, as a protection from insult or harm.

July 12th.—This morning we were joined by GOVIND SING BURSHER, the chief, or *Fauj-Dar Rewaen*, who came to accompany and conduct us through the district under his direction; he is a man of high cast, and considerable consequence, and has had the entire administration of the extensive *purgunnah* of *Rewaen*; in fact, he has of late been more like an independent Prince, than a governor; for, in so impracticable a country, he could not easily be called to strict account, either by the RÁJÁ or his conquerors; he had also been on good terms with the *Gorcha* chiefs, owing, we understood, much of consequence, to

and fallen master. Others, too, in like manner, though not enjoying the security resulting from any such tie, chose rather to trust to the protection of some *zemindar*, who they might have known and perhaps obliged, and by whom they believed their lives would not be attacked, than stake their fortunes on a more dangerous flight, though less of property in either case was certain.

Thus, individuals of this wretched people were found in every district of the hills, and every one stripped of his property, even to the necessary cloths to cover them from the weather. Many were still more deplorably situated; some, wounded and neglected, were languishing unassisted, in want even of necessaries; others had fled to the *jungles*, to escape the massacre their comrades fell victims to, and had for a long time subsisted on roots and fruits. Even the marriage tie did not always ensure good treatment; and not unfrequently, when the terror of consequences ceased, the *zemindars* recalled their daughters, and forced them to leave their husbands, although the stipulated prices had been paid them. Several curious cases were referred to us for decision, in which, of course, nothing could be done, but to leave the matter to the uninfluenced decision of the lady herself; and it must be said, that where the contract *was* broken, it generally appeared that the loss of the money, the price of the female, (from 12 to 15 Rupees,) was the most grievous part of the injury. That, they never would restore, or plea, that the contract had been originally made in great measure by force on the *Gorcha* side, and that one or two years' possession was sufficient to cancel it, provided it was the woman's wish so to do. Many however of these women left their families and country, and followed the party, with their *Gorcha* lords, perfectly voluntarily, and appeared not only fully equal to the fatigues of the march, but were of the greatest use to their husbands, occasionally carrying their children, and always cooking their meals, when arrived at the encamping ground.

hence, he is a fine looking man, far superior in appearance to the people of the hills, who, in fact, pay him much respect, and seem quite devoted to him.

We ascended the end of *Dhu'lu' Dhar*, and crossed it, and reached the banks of *Bedar-Ga'd'h*, a large rapid stream, in size nearly equal to the *Girri*; which has its rise in a high peak, called *Bashi'ncha*: we crossed it on a very ugly bridge, called *Shelli-ca-Sango*, consisting of two pine-trees of no very large size, thrown over a deep chasm, in which, far below, the river runs with great violence, and which being slippery, gave but uncertain footing; at the top of a short rocky ascent above this bridge, we reached the village *Nagwa'n*, which is of respectable size, and which gives name to a *t'hat* or division; here is one of GOVIND BUCHT's residences; it was once a populous and tolerably cultivated division; but most of its villages are now in ruins: five are still inhabited besides itself—*Paka*, *Sheaiwa*, *Cu'rfala*, *T'han*, and *Phuldara*.

The opposite side of the river is desolate and uncultivated, though the ruins of several villages are perceptible. The *Patrain Nullah*, nearly opposite, contains much level land, all now waste.

Just opposite the mouth of *Bedar-Ga'd'h*, there is a bridge across the *Jumna*, and on the other side, in a rock at the foot of the hill, in the bed of the river, is shewn a spring of water, which they say is of the waters of the *Bha'girat'hi*, and of which the following tale is told:

There yet exists near this a place of worship sacred to *Maha' Deo*, in which, in the old time, a Brahmin of great sanctity ministered. This holy person every day went to the *Bha'girat'hi*, said to be a full day's journey from hence, to perform his ablutions in its sacred stream, till

great age rendered this exercise impossible, when he prayed that some means might be afforded him of continuing this act of devotion; his prayer was heard, and he was desired to drop his handkerchief in the *Bhagirat'hi*, and wherever that should appear on the *Jumna* banks, there to wash in full confidence of that being of the waters of the holy stream.

THE Brahmin is gone, but the waters retain their sanctity in the estimation of the country, which confidently believes they are the effect of a miracle; a miracle ingenuously and successfully contrived, to continue to laziness or inability, the odour of sanctity derived from penance, without its pains.

FROM *Nagwa'r* we ascended at times rapidly, at times gently, through thin fir-wood; and this gently rising country quite waste, but once cultivated, and all capable of being so, to the village of *Shealwa*, much gone to decay.

CROSSING the *Cu'rsala* valley, in which is the village of that name, we climbed a steep ascent to the gorge of a pass, called *Canda-ca G'hat*, in a ridge continuous dome from a high peak, named *Tu'nal*. From this point, a water-fall below a mass of snow in the *Benderpuch'h* mountain, is very plainly seen, which we are informed is *Jumnotri*; it did not appear more than a long day's journey from us.

THROUGH a various wood of oaks, firs, rhododendron, &c. along the face of the hill, high above the river, we reached the point where commences our descent to *Pa'liá-Gá'h*, which forms the outlet to the waters, of one of the most terrifick and gloomy valleys I have ever seen. The lofty peak *Bachuncha* stretches a rugged ridge to the southward which joins *Tunal*, (the lower part of which we crossed,) and by these ridges

formed the hollow of *Cot'ha*, the chief ravine of which runs down from nearly the top of *Bachu'ncha*, and is joined by smaller but equally rough clefts from the back, which unite their waters below, and roll a rapid and large torrent to the *Jumna*.

On one of these ravines, are seen small hills of stones, resembling places of worship; supposed to be the residence of *devatas* or *spirits*, who amuse themselves with inveigling away human beings to their wild abodes. It is said, that beauty in either sex is the object of their particular predilection; that they remorselessly seize on any, whom chance or imprudence may place within their power, and whose spirits become as theirs, when deprived of their corporeal frame; many instances of such occurrences were given: on one occasion, a young man who had wandered near their haunts, being carried in a trance to the valley, heard the voice of his own father, who some years before had been spirited away, and who now recognised his son. Paternal affection it appears was stronger than the spell he was bound by, and instead of rejoicing at the acquisition of new prey, he recollected the forlorn state of his family, thus deprived of their only remaining support; he begged and obtained the pardon of his son, who was dismissed with an injunction of strict silence and secrecy; forgetting however his vow, he was deprived of speech; and as a self-punishment, he cut out his tongue with his own hand. This man, it was said, was still alive, and I desired he should be brought to me; but he never came, and I was afterwards told, he had lately died.

Several persons have approached the precincts of these spirits, and they who have returned have generally expressed the same feelings; and have uttered some prophesy; they avow, that they fall into a swoon, and between sleeping and waking, hear a conversation, or rather

are sensible of impressions, as if a conversation had passed, which generally relates to some future event. Indeed this prophetic faculty is one of the chiefly remarkable attributes of the place. The officiating Brahmins, sometimes venture further than the vulgar, and are favoured with communications of future import. It is said they foretold the misfortunes and death of the late Raja PARDUMAN SAH, the loss of his kingdom and life at *Dehra Dun*, and the commencement or rather completion of the *Gorkha Raj*. The awe and horror which the natives entertain for this place, is great and remarkable. They assert the impossibility of penetrating the valley to any considerable height, and that none, who had attempted it, ever returned without the loss of reason. I believe the physical obstacles to ascending the hill would be enough to prevent success.

July 13*th*.—From the nullah (which is crossed by a single stick) we rose to the village of *Pália*, where we rested for the night, and which is situated above the nullah called *Pália Gadh*, and not far below the gorge of the glen of *Cotha*. It is neat and clean and of considerable size, and has less the appearance of decay than most of those we have passed, but is not so thriving or large as *Dutkheat*, our last night's station; it is surrounded by a few fields and ledges of cultivation which occupy the remainder of the spot on which the village stands, but they are of no great extent, nor is there any more near at hand; we took notice, that many of the inhabitants were particularly fair, and they were fine stout looking men. The scenery in this day's march has assumed a character far more savage than we have remarked in any part of our tour; there is less wood, more rock, and the mountains rise more suddenly to their height, without affording the possibility of cultivation, even in the narrowest ledges; the weather too is darker, and the rain, which all day had

threatened, fell with loud bursts of thunder, which was awfully reverberated from rock to rock: and, during the night, more than once the sound was heard of fragments from the brows of the mountains crashing down to the depths below; our quarters were good, in a temple, neat and clean, and secure from the weather.

We left *Pálía* with a fine morning, after a rainy night; following the *Palia Gádh* nearly to its mouth, we turned to our left and followed our course as before, up the river side, ascending till the path was from 2 to 300 yards above its stream; the road hence is very bad, to *Asari Gádh*, a small stream, that rises from one of the smaller peaks of *Bachunchur*; at its mouth there is a peninsulated rock of considerable heighth, on which there is an old fort, called *Asari Gerh*; the rock is connected with the mountains over-hanging the river by a low neck of land, which is cultivated. At the bottom of this rock, and in the bed of the river, there are several small springs of hot-water, which we went to see; some of these sources, we observed, arose with considerable force from the surface of the earth, quite close to the solid rock, giving a stream of 3 or 4 fingers thickness, and much came trickling down from between the *lamina* of the rock, of which the hill is formed. These *lamina* are in large white flakes, and consist, I believe, entirely of quartz; they form an angle of about 65 to 70, with the plane of the horizon. The water is beautifully clear, it is more than blood-warm, and is strongly impregnated with acid: it has much of the smell common to sulphureous springs, and is probably impregnated with this substance, and with iron; for the rocks around were tinged and incrusted with a red matter, resembling rust of iron mixed with clay or lime. Quite close to the warm springs, and in the stream they form, a cold one bubbles up, but the mixture is so immediate, that it is impossible to say, whether the acid, which it also contains, is communicated from the warm water.

its smell and taste, however, resembled the other, and around its source upon the rock, there was a collection of scum, formed of green slime, and the red concretion, before mentioned; this was found in their united stream, until they reached the river; from the manner in which this water issues from the rock, it would seem, that its source must be in the body of the rock above, but there is no other appearance whatever to lead to a conjecture respecting its formation; in the course of the *Jumna*, however, there are many such springs of warm water.

A rough ascent and descent brought us to a bridge, which, about a mile from *Asari Gesh*, crosses the *Jumna*, here diminished to a small but rapid torrent. The bridge is laid from one large stone to another across a chasm, about 15 to 16 feet broad, through which the stream flows with a violence that would quickly prove fatal to any one falling into it. Hence the road rises on the left bank of the river, and passes through the small and poor village of *Teikeh*, and among scattered and ragged fields of cultivation, to the village of *Ouphera*, which has been a large and populous place, but is now in lamentable decay. There is here a temple to VISHNU, under the name of NÁG RÁJÁ; and we found the villagers preparing to carry the image, with songs and dancing, to be bathed at *Jumnotri*, an annual ceremony. Here the hills about the river open out a little, though there is little cultivation or room for any. *Palia* is almost the highest village on the opposite or right bank, and the whole tract between the *Jumna* and *Tonse*, said to be a space of 30* cos, is a wild and savage heap of rocky barren peaks, and dark impervious ravines. On the *Tonse*, however, even near to its source, there are many villages, and a good deal of land under culture. The distance between the *Jumna* and *Bhágirathi*,

* This distance is in all probability much exaggerated. I have uniformly found distances increased by report frequently to near double the truth, especially when the road was difficult: the true distance perhaps does not exceed 15 miles horizontal distance—nay, probably is much less.

at this point, is said not to exceed one day's journey; but from *Cursali*, the nearest village to *Jumnotri*, the country, from the one river across to the other, we are told is very difficult, and the road much longer; three days' journey, through a country in which there are no inhabitants, nor any supplies procurable, forming a part of it. This, however, we believed to be exaggerated, as our guides appear quite afraid of the difficulties of the hills, and delight in communicating their alarm, and throwing all obstacles in our way.

Pursuing our way along ridges of abandoned cultivation, we crossed the *Changhal-ci-Gád'h*; the banks of which are dangerous on either side, and one step is particularly so, as the path leads over a narrow ledge of rock, over which another projects, leaving a height so insufficient, as to render it necessary to creep on all fours, to pass through the precipice. A circuitous descent brought us to the village *Cursali*, chiefly in ruins; and a road similar to that we have of late been used to, brought us to *Ráná*, the village where we are to remain during the night; it has been a very short day's journey, and the reason given, was, that no resting place for the night intervenes between this village and that of *Cursali*, which was stated to be 8 *cos* distant, and forms one day's work of itself.

Immediately opposite to this village, there is seen the remains of one very wildly situated on the brow of a precipice overhanging the *Jumna*, fully one thousand feet in height. There is a very curious winding path-way down its face to the river bed; its name is *Cot'har*, and I believe it was, and remains little better than a den of thieves.

July 14th.—A path, very similar to that of yesterday, led us through the ruined village of *Baria* to the confluence of two streams, the *Dhéan-ci Gád'h* and the *Bhimci-Gád'h*; the former a small one, the latter

[illegible]

Gunga. Further to the westward and considerably to our left, a range consisting of many high and irregular masses, takes its immediate rise from *Damini Matha* (a continuation of *Bendrpatch*) and forms the western side of the valley, holding up the snow; between this range, and *Dumancandi*, the *Jumna* is formed, from many sources in the snow. The *Unigunga* runs at the foot of a level piece of land which stretches from the foot of *Dumancandi*, which latter range forms thus the division between the two basons, and rivers, which are nearly of equal size.

The name of *Bendrpatch* properly applies only to the highest peaks of this mountain; all the subordinate masses have names independent. *Jumnotri* has reference solely to the sacred spot, where worship to the goddess is performed.

Though only two are seen, the top of *Bendrpatch* is said to be formed of four peaks, in the cavity contained between which tradition places a lake or tank of very peculiar sanctity; no one has ever seen this pool, for no one has ever attempted to ascend these prodigious peaks. Besides the physical difficulties, there is one to be encountered far more conclusive to the superstitious and blindly obedient *Hindu*. The goddess has especially prohibited any mortal to pass that spot appointed for her worship. A sugeer, once in attempting to reach *Jumnotri* lost his way, and continued ascending the mountain till he reached the snow, when he heard a voice enquiring what he wanted; and upon his answering, a mass of snow detached itself from the hill side, while the same voice desired him to desist and worship where that rested; that *Jumna* was not to be approached, or intruded on in her recesses; that he should publish this, and return no more under pain of death; I suspect indeed that this prohibition is necessary to prevent an sa-

crossed the *Unta Gunga*, by an old and rotten but better constructed bridge than usual; the river roars in a cataract of considerable height a great way below with much noise. The village *Curfall* is close to this bridge; a short ascent led us to it. It is the highest village in this glen, and is situated on the bank of the *Unta Gunga*, 150 feet above its stream; and near the extremity of the plain before spoken of, as forming the point between the *Jumna* and *Unta Gunga*; this plain is of considerable extent, it may contain 200 acres, and is well cultivated; there were several villages upon it, but now, the remains of two, besides *Curfall*, only are visible. This last is large and tolerably neat, and probably populous; but at present it is full of the inhabitants of all the neighbouring villages, who have brought the images of their gods to bathe. The chief man of the village, with the pundits and brahmins of *Jummotri*, attended by a great number of both sexes, came out to meet us. The pundit, a mean and dirty looking fellow, clad with the rest in coarse blankets, came forward, and insisted on marking my forehead with the sacred yellow, a ceremony which I submitted to with a good grace as to a high compliment, and which was eagerly sought for by the hindu attendants, who, as well as the *Seana* and most of the villagers, received the blessing after me, and we all proceeded to our quarters.

The annual ceremony of carrying the images of their gods to wash in the sacred stream of the *Jumna*, is, it appears, one of much solemnity among the inhabitants of the neighbourhood; and the concourse of people now assembled here has been busily engaged, in doing honour to it. They dance to the sound of strange music, and get drunk on a sort of vile spirit, brewed here from grain and particular roots, sometimes sharpened, as it is said, by pepper. The dance is most grotesque and savage; a multitude of men taking hands, sometimes in a circle and sometimes in line, beating time with their feet,

bend, with one accord, first nearly to the earth with their faces, then backwards, then sidewa , with much grimace and many contorions. These, and their wild dresses of black and grey blankets, give a peculiar air of brutal ferocity to the assemblage.

THE men dance all day, and in the evening they are joined by the women, who mix indiscriminately with them, and keep up the dancing and intoxication till late in the night.

THEY continue this frantic worship for many days; and in truth, it bears much similitude to their general manners and habits—savage and inconsistent. At a place so sacred, where there are so many brahmins, and which is the resort of pious pilgrims, it might be expected, that a strict attention to the forms of religion, a scrupulous observation of the privations and austerities enjoined by it, would be particularly remarkable; here, however, much is met with, shocking even to those hindus who are least bigoted. All classes and casts of people, brahmins not even excepted, eat every sort of meat, save beef, and I believe fowls, and drink spirituous liquors even to excess. Fowls are in plenty in this and the neighbouring villages, and they were even offered to me as presents by the zemindars, which could not have been the case, had they been held in abhorrence. I was also surprised at their indifference, as to what might have appeared, and certainly would in the low country, be deemed pollution to their temples. They themselves pointed out the outer-room of a temple or place of worship for the use of the kitchen; and saw with perfect composure a mussulman servant, kill in it the fowls they had themselves provided, and dress them for dinner. I know not if the place was in general use for worship, it was old and in bad repair; but even to a ruined temple, the hindu of the plains would probably pay more respect than suffer such a use to be made of it. The dress of the people before alluded to is, in fact, the

same we have observed through the whole country, after leaving the lower parts of *Sirmor*; a jacket or dress of blanket, tying like the common hindu *angerka*, around the waist and open down the right breast, light in the body and on the arms, but with short skirts all round, very ample, and gathered in folds like the Scotch phelibeg; around their waist they wear a *cemerband*, either of woollen stuff, or of rope formed of goat's hair neatly plaited. They wear drawers or trowsers very loose to the calf of the leg, but tighter, and falling in numerous creases, to the heal; a piece of blanket stuff, somewhat lighter than the rest, is worn round the shoulders like the Scotch plaid, and is used to keep the body dry, or the head from the heat, as rain or sun may require; on their head they wear a black cap of hair or wool fitted to the scull, and ending in a small point. The wool from which they manufacture these cloaths, is of extreme coarseness; very far inferior to that met within *Bisheer*, or any of the hill states to the westward, which sometimes was woven into blankets of considerable beauty and fineness; their colours are only two, a dark brown, and the common dirty grey; the former is affected chiefly by the men of superior rank and means; not a rag of cotton cloth was seen; and the dress of the women in no wise differed from that of the men, * except that sometimes their heads were covered with a handkerchief blue or checked, and they wore beads of glass or pewter in as great profusion as they could obtain them; and *bangles* of the same metal of great size, round their arms and ancles.

The personal appearance of these people is much the same as that of the *Bisheris* about *Rampúr* and *Serán*. They have stout well built figures are frequently very fair, though much sun burnt; their eyes often blue, and their hair and beards curled; and of a light or

* They wore something like a petticoat instead of the trowsers, which the men dressed in.

red colour. They seem admirably calculated to be formed into soldiers for a hilly region. Here and there traces may be detected of the *Tartar* features, the small eye, high cheekbones and meagre *mustachios*, but they are not sufficiently prevalent to give rise to the idea of any considerable intercourse or intermixture. The language is still *Hindustani*, and though still very bad, it is rather more intelligible than that generally heard in *Bijeher*.

On making enquiry respecting the distance from this place to *Jumnotri*, the nature of the road, and the possibility of passing the night there, we were informed, that it is six cos, of very bad and rough road in the river bed; but that there is another route considerably longer with a severe ascent, which is sometimes used, when the river is too high to pass; but there is no place to pass the night in. We however believed the difficulties as usual exaggerated, and determined to carry the necessaries sufficient to enable us to remain a night, as I was exceedingly anxious to attempt reaching at all events some elevated spot on the mountain, both to judge of its structure, and to make observations from.

The morning was excessively cold: the heighths were clear, but clouds hung all around on the lower regions. Leaving every mussulman sepoy, the whole of the hindus set out on this pious errand; and the *Jumnotri pandit*, with some other brahmins, led the way: we passed the backward and green corn land, and entered *Jumna's* bed; the stream here is not large, but very rapid; we cross it on a stick, and the path here becomes dangerous and difficult, in fact there is no track; but we proceeded in the bed of the stream, crossing and re-crossing it as the lofty overhanging rocks on either side jutted into it and alternately opposed our progress.

By one of these we were at last compelled to mount, and scrambled up through a thickly tangled wood of forest trees, dwarf bamboos and creepers, frequently beholden to the roots and branches for our footing till we reached the point of a steep crag, on which is placed a small temple, sacred to BHAIRAMJI. The place is said to be half way from the village, and BHAIRAMJI is understood to be the avant courier of *Jumna*, and it is his duty to announce those who come to worship her. His temple merely consists of a few loose stones, and is not three feet high. There is no image; but it contains a number of pieces of iron, with one, two, or more sharp points, some twisted and some plain; a small brass canopy hung in the center; a small lamp and bell of the same metal, which is rung during worship. Here the officiating brahmin said a long prayer with some fervency, ringing the bell and offering flowers, (which where also presented by the attendants) thus propitiating the deity towards the strangers. The place is curiously chosen—very wild and gloomy.

THE descent to the river from hence is more dangerous than even the ascent, leading in some places along the face of the rock, where the want of natural footing is remedied by laying sticks along upon the roots of trees, or pins driven into the fissures of the stone. When we reached the river bed again, the laboriousness and difficulty of proceeding was greater than below; the water was more confined and the descent quicker; the current more strong and the cascades more frequent and greater in heighth; while, in constantly crossing and re-crossing the water, its cold (having just left the ice) was so intense, as nearly to benumb the joints. We soon reached the spot, pointed out from below as *Jumnotri*, but it was not the sacred branch; here two streams joined the *Jumna*, and the rocks are more open than below. From hence, though completely at the foot of this higher region of the mountain, the peaks of snow are seen towering above us, as ready to over-

whelm us; and in fact, the bed of the river is here stopt up by a prodigious mass of snow, which has carried down with it a mighty ruin of rock and soil. From under this mass of snow one stream flows; and just above, the *Ath-paisa Gunga*, equal to the branch which retains the name of the *Jumna*, rushes down in a broken cataract from the ravines of snow. From hence turning to the left, and clambering over a rapidly ascending succession of rocks, in a short way, we reach *Jumnotri*.

The spot which obtains this name, is in fact a very short distance from the place where the various small streams which are formed on the mountain brow, by the melting of many masses of snow, unite and fall into a bason below; to this bason however, there was no access, for immediately above this spot the rocks again approach over the stream, though their heighth is less formidable than below, and bar further progress in the torrents bed; a mass of snow, blocks up the further extremity of this pass, and the river issues from under it: between the two rocky banks, the breast of the mountain appears and closes the view, of vivid green, and furrowed by time into numberless ravines, down which are seen trickling the various sources of this branch of the *Jumna*.

At the place where it is customary to perform ablution, the rock on the N. E. side of the river is very steep, and seems of the same nature as that which has been noticed at *Asari Gerh*, apparently quartzose, and chiefly white, but exhibiting a variety of shades and colours. The structure like that too is *laminar*, and from between the *lamina* run several streams of warm water. There are several other sources: and one particularly, whence springs a column of a very considerable size, situated in the bed of the river, between two large stones, and over it, falls a stream of the river water.

This water is much hotter than that before taken notice of at *Ajari Gerh*, as well as in greater quantity; the hand cannot be borne in it for a moment, and it emits a very considerable quantity of vapour. I could not detect the least acidity to the taste, nor any sulphureous, or other smell; it was perfectly pure, transparent and tasteless. A great quantity of a red crust, which seemed to consist of an oxid of iron, with some gritty earth, covered all the stones around and under the stream, and was to all appearance deposited by the water. This by exposure to the air, hardened into a perfect, but very porous stone; whilst below the water it was frequently mixed with a slimy substance of a very peculiar character; very tenacious; of a dull light yellow colour, some what like Isinglass: it was certainly as well as the above described crust, produced from the water, for it covered the stones, over which the stream ran, and was very abundant. These warm springs are of great sanctity, and the spot for bathing is at the point before mentioned, where the cold and warm water mingle and form a pool about milk warm. The springs have all particular names such as *Gauri Cund*, *Terbet Cund*, &c. and as usual some, superstitious tale is related of their origin. It is said, that the spirits of the 12 *Rishis*, or holy men who followed *Mahá Deo* from *Lanca*, after the usurpation of the tyrant RAVAN, to the *Himála* range, inhabit this rock, and continually worship that Divinity; why this should produce warm water, is not quite so clear. Here however, all the people bathed while the brahmin said prayers and received his dues.

ALMOST every sort of stone and rock, which we have seen in our course through the hills, is observed in the bed, and on the banks of the upper part of the *Jumna*. Of these, two predominated, that first met with in the course of the *Paber*, in large rounded masses, was particularly plentiful, consisting or composed of much mica, quartz, and

coarse sand or grit with abundance of a hard black substance, probably hornblende. The mass is of various, but generally great hardness, and I believe, it is a species of true * granite.

The other next abundant, was that white laminated rock, from which the hot-water trickles, and which has been called quartz; it is met with of yellow, red and greenish tinges, but always in lamina. *Shistus* or slate, of every sort, micaceous, and coloured of every tint, and of all degrees of hardness; grey, red, whitish and bluish, is also abundant, and always plentifully veined with quartz. This stone, is by far the most common and plentifull all over these hills. There was no lime-stone, evident, unless some specimens of the white laminated rock resembling marble, be of a calcareous nature, which is not improbable; but I had not an acid of any sort as a test, and have to regret my incompetency to speak with any degree of positive certainty on mineralogical subjects.

During the course of our tour, it was peculiarly observable, that the rocky and more abrupt faces of the loftiest hills, in the whole extent from the plains to the snowy range, pointed in a north westerly direction, but varying very much, according to situation and circumstances; and that the opposite faces, though always rough and unequal, were more sloping and less precipitous: this disposition was more conspicuous and distinct, the further we entered the hills and the nearer we approached the high rocky peaks of the snowy range.

It was also obvious that the structure of these rocks was stratified; sometimes consisting of different kinds of stone, at others apparently of the same sort exhibiting merely this tendency in the formation and fracture. These strata were always at an angle with the horizon; dif-

* I think that some part of this rock was believed to be *Steatite*.

fering materially in its elevation, but generally about 15 degrees, and most frequently pointing in a line from north east, to south west. This formation was peculiarly evident in the rocks forming the banks of this part of the *Jumna*.

It would be pleasing to speak of the vegetable productions of this remote spot, but here I am equally unable as in geological enquiries, to satisfy scientific curiosity. Those trees and shrubs which are met with through the whole range of this hilly tract, are also seen here, and there are several additions, which could they be botanically described, might be interesting. Of pines, those which resemble the silver and spruce fir, as well as one perfectly resembling the Weymouth pine with two sorts of *Larch*, are found; the birch, and a species of the sycamore, oak of several sorts, with a great profusion of trees and plants cover the rocks and hills, to the extent of the woody region; the strawberry, both the common *scarlet*, and the *alpine* sorts, and fine and large of their kinds, with raspberry and blackberry bushes, were very abundant; and here for the first time I recognized the black currant bush. The round leafed rhubarb we also saw, but I could not find, that the natives used it medecinally. The *Gorkhas* used their roots as a poultice, to apply to bruises and hurts. The pundit presented me with an herb of peculiar and very pleasant smell which he pulled from off the bare rocks, at the highest part of one day's journey, it was called *Mahi*, and is considered sacred; it was very small, not growing above 2 to 3 inches in height, with a small bunch of leaves resembling fennel.

Our return down the bed of the river was rendered fully more difficult and dangerous, by an increase which had taken place in the size of the stream, since we ascended.

Sudden fluctuations of the size of the river are very common without any immediately apparent causes; and they are to be looked for in the changes of the atmosphere, which take place very rapidly in these hills, and have a speedy effect on the snow, and consequently on the many sources of the river; partial falls of rain too occasion a quick, but momentary rise. Even when low, the dangers of the path are considerable, and I am confident, that by this road, it would be impossible to reach the place, was the river at all higher than we found it. Though trifling in detail, the obstacles are numerous and serious in practice, and it is the first day's march we have made, where I thought the danger and difficulty considerable.

When we arrived at the village, enquiry was made respecting the route to *Gungotri*, and it appeared their were two ways. The one would carry us back 3 day's march on the road we came, and crossing the country between the *Jumna* and *Ganges*, where it is narrow, would take us to *Barahât* on the banks of the *Bhágirat'hi*; this would occupy 4 days, and *Gungotri* is called 8 more from them, but the road is very easy, and provisions and necessaries plenty.

The other road it is said goes over a high country, through snow, it was first called four days, but now allowed to be only 3 day's journey from hence to the next inhabited spot; the whole way desert and dreary, but perfectly practicable. But both Govind Bhisht, the *Seana* of the village, and all the zemindars who knew the path earnestly dissuaded me from making the attempt. They say, that during the chief part of two day's march, in crossing a high snowy hill; they meet a poison in the air, which so affects the travellers, particularly those who carry loads; that they become senseless, lay down, and are incapable of motion. They cannot account for this phœnomenon; but believe

it to proceed from the powerful perfume of myriads of flowers which cover the small valleys on the hill sides; but they themselves are not apparently satisfied with this explanation of the difficulty.

On reflecting on every circumstance which had passed, and weighing these now laid before me, I determined to attempt this dangerous route.

July 16th.—We left *Cuffali* at 6 o'clock, and crossing the *Unta Gangá* a few furlongs, above the bridge began our ascent which leads us through various jungle to *Sirupali-ki-Dhar*, whence a noble view would be obtained, but for the usual circumstance of mist overspreading the country around; birch-wood was very plentiful on this ascent, little differing from the common birch of Europe; the leaf is larger, though of the same shape, and it is not so fragrant as the beautiful ornament of the Scotch woods.

From hence we continued our ascent up a steep hill face covered with short grass, small mountain flowers and stunted bushes, which gave it a strong similarity to many of the brown hills of Scotland. And here indeed I first discovered their own characteristic plant, the true *heath*, or *heather*; it is not exactly the same species as that most common in the highlands; its small leaves cover the stem in four regular rows upwards, so as to give it a square appearance; its bell is delicate and white: and at some distance it is very similar, save that it has not that blooming purple glow, that gives the mountains their rich colours. I have seen it however growing among the other species, though not abundant. Here too that beautiful bird, the Peacock-pheasant* was seen and heard in greater numbers, the higher we rose, and might have been taken for *Grouse* in their own *Heather*.

* The bird is called indiscriminately *Reteel* or *Mocel* by the natives, and is one of very uncommon beauty. The cock bird has a body of dark glossy blue; the neck and breast shining with purple and gold, like that of a peacock. On the head he carries a crest of several feathers, which forms a shining plume;

THE ascent from *Sunepalli*, to *Dig Dhar* is steep and irregular, leading over many high peaks, and continues along the brink of a very deep precipice, the bottom of which was however not in view, from the thick fog that filled the vallies and enveloped the heighths; our path is good but tiresome, from dipping and ascending frequently. *Bender-puch'h* lies on our left hand.

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when flying, his back uncovered by the wings, shews white; and he spreads a tail of reddish brown feathers. His note is a peculiar and very mellow whistle; he frequents the highest, coldest, and least accessible peaks; and it appears, that the higher we ascend, and the nearer we approach the snow, the more frequently they are met with, the more numerous they are. In to-day's march, we have found more than on any preceding one; but they cannot be considered as at all abundant. The ben bird is of a speckled brown colour, a little larger than the *Heath hen*, (the female of the black or wood grouse,) and has much of her appearance. Their flesh, particularly that of the young ones, is very delicate, and has much of the game flavour.

No game, of any sort, is found in plenty in these remote hills; nor in fact, are any species of animal in a wild state seen in any abundance; but there are several sorts of deer now and then met with, and of these perhaps the *musk deer* is the most remarkable. They are scarcer even than other kinds, because the valuable drug they afford, renders them an object of more eager request.

The musk, it is well known, is contained in a liquid state in a bag, at or near the navel of the animal, and is taken from it just as it is found, with that part of the skin attached in which the bag is formed. A small hollow stick is introduced, communicating air to the musk, till it dries, and the whole is tied round with a sinew of the animal. In this state the whole (called a *mounk nafe* or *musk pod*) is sold; skin, sinew, and all, for about twice its weight in silver, and is very highly prized in the country. It is said, that the bag containing the musk, must be extracted from the animal, while yet alive; as, if he dies, or is killed, it dissipates, or is re-absorbed into his body; which is the reason he is never shot, but snared alive, and it is common, when it is known, that a musk deer is on a neighbouring hill, to turn out the country to hunt him down. From the great value of this commodity, it is natural to suppose that it is frequently adulterated, and accordingly this is done by injecting a portion of the animals blood into the bag, while the musk is yet liquid. Thus in purchasing this drug, much caution is requisite. It has been said, that the quantity produced of this drug is small; the musk pods are commonly sent to the chief or raja, either as presents or at a certain rate, in lieu of so much tribute. A small part is bought by the low country merchants, who find their way to the hills, and who receive musk, opium, iron, &c. &c. in return for the cloth, sugar, &c. which they bring; but, on the whole, there can be no great annual supply; and if the hills to the south eastward produce the animal in no greater abundance than those that lie between the Alacananda and Setlej, the market can never be supplied, far less glutted, with genuine musk.

Another sort of deer, is called by the natives the *gurrl*, and this is the only sort that has fallen under our own observation. It is dark brown and of the size of a roebuck, and has horns resembling that animal's, from 6 inches to a foot in length, sharp at their points, and rough at the lower extremities: it is extremely active, and was only seen upon impracticable precipices.

Of other animals we only saw the horns, and were informed of their existence upon enquiry, to which we were led by seeing these horns in large numbers hung up in, and about their temples. This is a universal custom, and every species of animal that carries such weapons contributes to thus ornamenting these holy pla-

Reaching a point called *Gurud-ch-Ghât*, we descend into *Curmi-ch-Gâd'h* which has its rise by two sources in *Mooroo-Tiba*, and joins the *Bhin-ch-Gâd'h* about one mile below, to the right. A weary ascent and unpleasant path along the hill face, carried us to a point just above *Bhin-ch-Gâd'h*, into the bed of which we descended along a hill face, covered with fern, the lower part of which was scantily clothed with shaggy birch; from the time we left *Sunapch-ch-Dhâr*, we were beyond the region where wood can grow, and it is only in the lower parts of the valley, just on the nullah's banks, that we again discovered it re-appearing in this thin stunted birch; we have passed much snow in the clefts and hollows, though the road has not actually led over it.

The *Bhin-ch-Gâd'h* here, is larger than the *Jumna* at *Curfali*, but it has every appearance of having been temporarily swelled by a fall of rain which has been heavy to-day in the mountains; it is very muddy, and extremely rapid.

And the hills here seem abrupt to the south, and point their strata in directions between S. W. 20, and S. E. 20; inclined to the plane of

ces; even rams horns have their place. One sort we observed were very remarkable; when on a middling size, they are at least 3 feet long, they grow near each other at their base, and fall backwards with a bold semicircular curve and diverging from each other gradually; on the upper curved side there are ridiculations, from 2 to 3 inches distant from each other, the whole way from the base to the top.

The natives say, that these horns are the produce of an animal partaking of the appearance both of the deer and the goat, but more particularly resembling the latter; that it is large, as may be inferred from the horns, and that it is only found in the most remote, inaccessible, and cold parts of the hills; that in the depth of winter, when the very valleys are covered with snow, which indeed remains on them for 5 or 6 months, this animal comes down almost to the very villages, with herds of other species; it returns as the snow melts, to its fastnesses, and about this season is seldom seen. The natives call it * *Burel*; its skin is furnished curiously with a thick soft elastick hair, and forms a comfortable bed to lie on. They are accustomed to place its horns not only in temples, but on the graves of such as were in their lives esteemed holy; and appear to attach to them some mysterious charm. We found one pair on our route, which had been placed at the spot where a man had perished in the snow; they were quite destroyed by the effect of weather.

* *Burel*, see Moorcroft's tour. *A. R. Fel.* says; there can be little doubt, but it is the *Argali*, or wild sheep.—*Secretary.*

the horizon at an angle nearly similar to that before observed (45 degrees;) such are the hills forming the north side of the glen; those on the south side, presenting their northern sides to us, are more rounded and smoother than ordinary, covered with green and brown, as if there was much heather; much snow upon them towards their tops, and large scaurs of black and white rocks, streak their breasts, where the snow or the rain has bared them of soil; the very skirts, are fringed scantily with stunted wood, whence run green slopes covered with fern and a beautiful sort of thistle, through which burst a profusion of flowers of every hue, and in a deep stoney bed, winding through this green valley, runs the *Bhím-ci-Gádh*.

We continued along the stream for some time, and passed a spot, where for several furlongs the water runs under a large mass of snow that fills up the bed entirely. Beyond this, the valley opens out considerably, displaying a pretty wide extent of rich verdure, though snow is all around; indeed for nine months of the year, the bottom of the valley itself is covered with it. Thus no cultivation can be attempted; but the vegetation is rapid and luxuriant, affording pasture to large flocks of sheep which are driven here at this season.

We soon came to our encamping ground, which is near the top of the glen, a little way from the bridge of snow. A cave, under a large stone called *Bhím-cá-Udár*, served as a covering; under this and a few similar rocks, our party to the number of 60 or more, contrived to accommodate themselves.

We have reached the top of the valley of *Bhím-ci-Gádh*, and are in the heart of the snow; the hills which form the valley, are continuous with the range of snowy peaks, that quite close to us in front, bound

our view. A rocky ridge divides the large semicircle before us into two parts; in the back ground of that on the left hand, the western peak of *Bender-puch'h* rises to a prodigious height; while from its bosom stretches down a large hollow of deep snow, cut into ravines, and precipices of a fearful heighth. The mountain itself exhibits one huge snowy mass, without speck or stain.

On the right, *Sumeru Parbut*, a peak hardly inferior to *Bender-puch'h*, forms the center of a snowy hollow, as rugged and deep as that to the left; from each of these, streams arise, which unite, and form *Bhim-ki-Gádh* at a very short distance from hence. As we were but a very short way from these hollows of snow, we obtained a better idea than we had any opportunity to do before, of the vast thickness to which it has accumulated.

The hill people assured me, that it must be 500 cubits, while I was loosely supposing to one of them, that the face of one of the precipices of snow was 300 feet; this shews the opinion the natives entertain, but indeed only the wildest conjecture can be offered, for what mortal can ever reach them; they are desolate, cheerless, and unapproachable.

The journey of to-day, is the first which has been totally desert; not a house, nor a hut, nor any vestige of cultivation, nor trace of man, has any where appeared; it has been desolate throughout; but the hills have been particularly verdant, and the pasture very rich; not only a variety of grasses covered the ground, but a profusion of the loveliest flowers bursting through this green carpet gave the liveliest effect to every slope and bank; the beauty of the thistles and ferns, was particularly conspicuous, and cowslips, polyanthuses, orchises and

lillies of every colour and species were in great profusion. Among other shrubs, to-day we remarked the common juniper, easily recognised by its berries and smell.

July 17.—The morning was cold and foggy; by a little after day light, we were in motion, and continuing our course to the very top of the glen, crossed *Cúnál-ci-Gád'h*, just as it leaves the bosom of snow below *Bender-puch'h*, upon a bridge of ice; hence crossing the point formed by the junction of the two water courses, we passed many of the small streams that form this easternmost branch of the *Bhim ci-Gád'h*, and commenced a very difficult ascent along the principal one which falls here from a large mass of snow and continues to run under it; this was an exceedingly painful part of our road, as the ascent was very steep and slippery. The ground was here bare and the grass stunted, yet there were still plenty of flowers; a little further on, vegetation decreases still more; hardly any thing being seen, where the ground is bare of snow, save a scanty green slime and brown moss, like that found on barren damp grounds. A bason or hollow was here formed in the mountain of snow, and the ruins of the peaks around, heaped on each other. It was exceedingly cold, and a moderate warmth even, was only preserved by the toilsome exercise of climbing these heighths. Many of the cooleys, and several of the sepoys, both *Gork'ha* and *Mewati* now began to lag, and were hardly able to proceed, and every one complained of the poison'd wind. I now began to suspect that this supposed poison was nothing more than the effect, which the rarefied state of the air, from the great heighth we have reached, has on the lungs; and this supposition I was led to frame from my own sensations; I could hardly command strength enough to climb the steep rocky path, and experienced in breathing much difficulty and oppression, as if there were an insufficiency of air. I do not think we could long have borne it, had

the ascent continued much further. In this basin we passed a small pool of water, held very sacred; it's name is *Mátri-ci-Tál*, and from it the chief stream of *Bhím-ci-Gádh* issues: it is filled with ice and surrounded with snow.

From hence we passed over another hollow and steep ascent of snow, which lies deep on masses of bare rock, and reached the top of the ridge called *Banfirú-cá-Ghát*. The cold was very great, and it was painful to remain any time in inaction, yet every one was indisposed to motion, and a tendency to sleep was very perceptible. The moment that any one who complained much of the oppression at breast lay down, he instantly dropt asleep, and was with difficulty roused: eating a few mouthfuls gave a slight relief, but nothing materially alleviated it, nor was any one free from the general symptoms of debility.

If the line can be drawn with any degree of exactness, the bottom of this ascent appears the extreme heighth to which vegetation extends. At the top, there is not even the dull moss or lichen seen below; the stones are bare and unchanged, except by the air; and no sign of life appears, except a few *reinás*, and these flew together in coveys.

This being probably the highest point to which we were likely to ascend, I took particular notice of the rocks which composed the mountains: fragments of which chiefly formed the ridge we stood upon. They were principally the same as those remarked in the bed of the *Jumna*.

That hard stone, formed of white and black materials, and first met with in the *Paber's* bed was most abundant; micaceous schist much veined with quartz; and a sort of moderately hard bluish stone, much

pervaded with shining particles, and common in all rivulets at home, with several less remarkable sorts, lay in varying quantities all around. I think also I saw that common sort called whin stone, but in no great quantity. During the short opportunities afforded me by partial openings in the fog, I took particular note of the nearest and highest cliffs in view; and as far as the glass could determine or be trusted, they consist of the same kinds of rock as those found in the route we have gone over to-day, and just now described; the colour, the shape and fracture, is similar; white, red, reddish yellow, black and blue, at times in strata, at times in shapeless masses; but the primary formation of the hills is always stratified; the angle of elevation, and the direction of these strata, is ever the same.

The ridge in which is *Bansúrú Ghát*, is continuous with *Bansúrú-cá-Dhár*, which sweeps down to the southward in several peaks from *Sumérú Parbat*, and is thus connected with *Bender-puch'h*; beyond the *ghat* to the southward, it rises into several high peaks, and is lost in *Bácri cá-Dhár*, *Panda Rassu*, &c. The western side is that which we ascended, the eastern looks into a similar bason to that we have passed, from the snow of which *Bansúrú-cá-Gad'h* flows to the *Bhágirat'hi*; it is singular that on the eastern side there is more soil, though not more vegetation than on the west, in spite of the action of the snow, which it might be presumed annually wearing the mountain away, would leave little on its side but bare rock.

From this *ghát* the road wound along the mountain brow, with many deep indentings and irregularities, but with little general descent, if any, and was accordingly laborious, passing over much snow, and moist slippery rock, till we reached a pass called *Ch'hayá-cá Cánta*.

Ch'hayá-cá-Cánta is the point at which the true descent commences, and I believe is little inferior in heighth to *Bansúrú-cá-Ghát*; it is

said that in clear weather, the plains of *Hindustan* may be seen from hence; but a thick fog, with heavy rain enveloped us at this time, and completely baffled the hopes I had of gaining any useful bearings.

A VERY steep rapid and difficult descent begins here and carried us to the source of *Chinpo-gádh*; which is here formed from a number of sources, from the melting snow. We followed the course of this stream, rapidly descending for a very long way, till it is joined by another and far larger one, called *Ríndí-gádh*, which has its rise in a prodigious snowy hill named *Dúdian-ci-Bamea*, to the north west: it is very rapid and impassible. The spot where these streams meet is called *Lama T'halan*, and is very lovely.

PURSUING our course along the united stream, now known by the name of *Ríndí Gádh*, we crossed it upon a very large mass of ice, which filled up the bed for a long distance; and a mile further, on reached a spot, thick in forest, which is marked by some very noble fir and sycamore trees, under the shade of which our guides proposed that we should pass the night; and thus, the formidable journey which they earnestly dissuaded us from, and which was reckoned by GOVIND BHISHT at 40 cos, proves to consist of not more than 27 * miles, or 18 cos; a distance we could easily have traversed in two days, but for the following reasons. That but few situations are found where the requisites for shelter and fire, may be met with, so as to be fit for a halting place. *Bhím-ci-Udár* being almost the only one; and even there fuel is only procurable at

* Of the wheel; one day's journey, ... 10½ miles.
one ditto, ... 11½ ditto.
hence to the village *Sé'bí*, ... 5 ... ditto.
10½

a considerable distance; and, that the steepest and most painful ascent commences near *Bhim ci-Udar*; between which ascent, and the place we have now reached, there is no spot where rest, shelter and firewood for a night could be obtained. Thus travellers must remain the first night at *Bhim ci-Udar*, as the two day's journies are far too laborious to be performed in one; and the severity of the second, fully makes up for the ease and shortness of the first, both by the steepness and difficulty of the country, and the badness of the road, but above all by the artificial fatigue brought on by the oppression of breast which we all felt so much.

The vegetable productions of to-day's march, though much of it was quite bare of vegetation, were very various; two flowers particularly attracted attention; one was called the *Gugul* and grew somewhat like the common flat thistle, with leaves radiating from a center, like the representation of a sun; in the center was a flower level with the flat leaves, much resembling the blossom of a pine apple plant. This flower is held in high religious veneration. The other consisted of a stalk covered with large and long leaves, somewhat like those of a primrose; ending in a cup resembling that of a tulip, but which was formed merely by a continuation of leaves of the same sort; which closed round the stamina and pistil, forming the petals of a very noble flower. These at their insertion were greenish, like the stalk and lower leaves; but their upper parts are black and yellow, and the center of the cup is of the same color, but far more vivid. The hill people called it **Birmah Caunla*, because, as the guide informed us, "it was as the raja among flowers." We could obtain no explanation of the terms, and therefore the application of the name is not intelligible.

* The divine water lilly or Camala.

No living thing was seen on this march save the *monal*, which flocked together in packs, and appeared of a species somewhat different from those in a lower region.

July 18.—The morning was misty; the gorge of *Ch'hâyâ Canta* was however distinguishable at a prodigious heighth above us. That pass, we are informed, was the scene of a great battle between the rebellious zemindars of the remote parts of *Rewaen*, and the troops of the raja; which, to the amount of 2000, were sent to collect the revenue, and punish the notorious and daily robberies which were there committed. The zemindars upon a foreign interference, joined and encountered the weary and starved troops, and killed the greatest part of them.

Leaving our pleasant grove, we descended quite into the nullah's bed, and by a rough intricate path through thick jungle, we reached the *Sûrî Gâd'h*, a rapid torrent of the same size as the *Rindî Gâd'h*, and crossed it by a wooden bridge, whence a steep ascent led us to *Candî-câ-Ghât* or *Candî-ci-Dhâr*. This probably ends the detail of ridges which are thrown off by *Bender-puch'h*, and its dependent hills, and which we have crossed on our route during these two last marches. The ravines dividing these, all send their waters to the *Bhâgirath'i*, and chiefly between the villages *Súc'hî* and *Gâssalec*; but many inferior ranges rise, which stretch to the southward as far as the plains, and swell that river with the streams they give birth to.

From this heighth we first obtained a momentary glimpse of the *Bhâgirat'hî*, running far below in a narrow rocky bed, and the enormously lofty and sharp peak of *Srî Canta*, distinguished between clouds, gave a noble earnest of what the view would have been if weather had at all favoured us, but mist again enveloped us and dis-

appointed our hopes. We left our lofty station, and by a rough steep descent reached the village of *Suc'hi*,* which is situated near the foot of a hollow that runs down from *Canda-ci-Dhár*, and nearly a mile from the *Bhágirat'hi*; we have passed through some straggling cultivation, but the country has much the air of neglect and depopulation. Some fine old walnut trees, and many apricot and other fruit trees, shew that the village once was large and thriving.

The river from hence appears nearly as large as the *Setlej*, when we first saw it at [illegible]; but its banks are far wider than any thing we have yet seen, and the chasm in which it rolls is on a much larger scale, and the savage roughness of its mountainous precipices keeps pace with their increase in size. Bare rock is much more predominant, and wood, every where thinly scattered, still more sparingly sprinkles the rocky pinnacles, which form but one precipice from their peak to their base; such is the appearance of the river bed viewed downwards from *Suc'hi*, in a line, but little to the west of south, till shut in by closing mountains.

Leaving the village, we crossed the end of a ridge a little above it, and descended to the river side, at the lower part of an opening in its bed of a singular nature; it meanders for more than two miles in a flat shingly space, which may vary in breadth from one to six furlongs broad. Just above this space, on the west or right bank of the river, three villages are situated on a slope, somewhat less inclined than the surrounding hills, and on which there are many fields of wheat, &c. Precipices descend on the opposite side quite down to the river; at the lower end of this shingly space, there is a slight wooden bridge, under which the river now again contracted, runs with great violence. Crossing this, one road lay along the bottom of the precipice, where

* See this village in the outline of Lieutenant Webb's Survey.—Asiatic Researches, Vol. xi.

there are many bad steps; two miles from the bridge, on the opposite side, the *Sheal Gad'h* enters the river, which rises in a lofty wild range to the north of *Benderpuch'h*, called *D'hum B'hor*, along which there is a very dangerous path leading to the remoter parts of *Rewaen*. The hill itself seems to be an object of superstitious fear to the hill people.

The course now was nearly east, and the road became very difficult. Two large streams join the river a little way on; the *Gúmti*, and the *Herstla Gangá*. The first bears a large body of water along a most craggy and tremendous cleft in the right bank, and, we are told, takes its rise on the south-east side of a snowy hill called *Bisehel*, forming part of the boundary between *Rewaen* and *Biseher*, and probably runs in a direction from south-west to north-east, or from west to east, to the north of *Benderpuch'h* and its range; it is said to be eight day's journey hence to the north-west, the road through snow, and very arduous and dangerous. The *Biseher* men who come to *Gangotri* and the neighbourhood, either from religious motives, or to steal sheep, make use of this road when the season admits of it.

The *Herstla Gangá*, just above the other, is of less size, the chasm it runs in, as wild; it has its rise in the *Qurdiro* range, and between it and the *Gúmti*, there is only a narrow slip of sharp rock near their *debouche*; the gap in the river bank, that admits these two rivers, is very remarkable for its sharp craggyness.

Just beyond, on the eastern bank, are the ruins of a village named *Cachoára*, where once a *Rana* lived who held sway over all *Jhunaur*; but some quarrel arose with the *Bhotias*, who live under the *Chinese* dominion, no great distance from hence, and these people came and destroyed the village, deposed the *Rana*, and demolished a temple, which was in considerable repute, to the God *Rais*. The *Pandit* of

Gangotri, who was the relater, cannot say when this took place, but as it is traditional, and this species of information does not appear of long endurance among this people, it may probably not refer to a very distant period. The ruins of the *math* or temple, are still to be seen. The village *Dérâli*, our stage for the night, was but a short distance onwards, and we reached it easily by 5 o'clock.

This village, the highest in the valley of the *Bhágirat'hi*, is situated just above the confluence of the *Keri Nullah* with the river, and is stated to be 12 *cos* from *Gangotri*: it formerly was populous, and comparatively rich, the revenue it produced being 75 rupees annually, of which 22 were appropriated to the holy purpose of supporting the religious establishment of *Gangotri*. In the time of the *Gorc'ha* power, 45 were thus bestowed; but, by the *pandit's* account, who related these particulars, little or nothing now arose from this source. Just opposite, on the other side of the river, is situated the village of *Makabba*, once populous, and of its revenue (also about 75 rupees) half went to the establishment of *Gangotri*, and half to the catching and training of hawks for the *raja's* amusement. Now, the *pandit* and his family alone, consisting of about 15 persons, remain of its whole population. The village of *Cachaura* also, till lately, produced a revenue to the crown of 75 rupees, but now it is quite desolate; and this total desertion or partial deterioration, is universal in the country. A village called *Suwarga*, which formerly existed at some distance below, was presented, it is said, by *Raja* MÁN SINH when he came to bathe at the sacred spot, to the *Gangotri* establishment. Now the *zemindars* have totally deserted it, and only the name remains. There can be but little doubt, that this defalcation in cultivation, inhabitants, and general prosperity, may be referred to the iron rule of the *Gorc'ha* conquerors.

July 19th.—A misty morning succeeded a night of drizzling rain, and we set off for *Gangotri* about 7 o'clock; the distance we were told

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There are in truth no roads from hence, save that by which we came, that lead through any practicable, or indeed to any habitable country in the first instance. But there are, as has been before remarked, paths which are used by travellers for shortness, or by thieves on their excursions to plunder neighbouring districts of their sheep and cattle, during a few of the summer months, when the snows are lessened; and thus frequently a prodigious round is cut off from a journey, where the usual low road is taken. For, in these hills, places that are in fact very close to each other, are moved to a ten or twelve day's journey, by the imperious nature of the country, and this is well exemplified in the relative positions of *Gangotri*, *Cédarnath*, and *Badarinath*, which all lie in one ridge of hills; and of which, the first and second are not, by [illegible], 13 to 15 horizontal miles distant, while the second and last are still more near. Yet taking even the shortest route, and going the longest marches, ten or twelve days are requisite to [illegible] from *Gangotri* to *Cédarnath*, because a very long round is taken [illegible] mountains to [illegible] practicable. Of this road, I could gain no distinct information; no one here had ever at[illegible] it, but it is described as worse than that from *Jumnotri* to *Such*, and extending to fully eight days, during which no habitation or trace of man is seen, and snow is chiefly predominant. There is neither shelter nor wood.

The lower road by *Cachour* is even more tedious, and is in fact equivalent to going down the river, and up the other, for it passes within one day's march of *Sirinagar*.

From this information, insufficient as it was, we were obliged to abandon the design entertained of visiting *Cédarnath* and *Badarinath* on this occasion, for our time was too limited to take the lower and more easy road, and I feared the upper and desert one, on account of the people who were already much exhausted by daily marching for a month running, and of whom even two night's exposure had made a considerable impression. When this was evident, and when it was considered that this exposure would be prolonged to at least 8 days, during which the cold and fatigue would at least equal that of the two gone by, without the means of procuring wood to warm them, and that it would be necessary to carry provisions for these 8 days along with us, while procuring porters was a very doubtful matter; it may not, under these considerations, appear unnecessary to have abandoned the further prosecution of our intentions, and I with much reluctance did so.

Similar in its nature to these desert roads, but perhaps more dangerous and dismal, is that which leads along *Shear Gadh*, and across *Dhum Dhar* to *Rawain*, one of the remotest divisions of *Rawain*; of this route, the following account was obtained: It is wholly desert, and at all seasons lies chiefly through snow; proceeding up the valley of *Shear Gadh* by a steep and rough ascent, a more level path is gained, which leads to the usual resting place, a cave; the whole distance only about [illegible] cos, and the latter part entirely through snow. The 2d day's journey is of nearly the same length, and like the first, in a direct northerly course, having *Benderpuch'h* on the left hand to the south westward, visible on every hand, during the day, nothing is seen but masses of snow and sharp rock in high bare peaks; the oppression at the chest and difficulty of breathing continues great all this day, and the resting place is a cave in the snow. The 3d carries the traveller across the *Dhum D'har*, at the point where the river *Tonse* arises from its west side; and following its course for [illegible] cos, he reaches [illegible] the banks, called *Thagur Salu*. The last or part of the descent is to the north west. From this place the 4th journey carries him in a south west direction along the *Tonse*, to *Uslah*, the first village in *Bawarey*; one cos below *Uslah*, the village *Gangar* is situated in a southerly direction, a little to the south east of which is *Dhaiwara*. Another person made this journey in 3 days, reaching *Thagur Salu* the 2d day, and *Uslah* the 3d; he calls the distance of the first day's journey 8 to 9 long cos, entirely southerly, save the latter cos, which tends westerly.

is 12 *cos*. Several points were to be arranged before we began our march; the *brahmins* requested that no *mussulman* might be allowed

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The direction of the extensive and lofty range of *Dhaul Dhar* is certainly very near north and south, and it is nearly as certain, from the accounts of every one who was interrogated, that the *Tonse* arises far north, on its western face, and thus has a course from considerably to the north of the *Jumna*.

As no wood is to be found on such routes, those who travel along the higher and more inclement regions of the hills, are under the necessity of carrying blankets to protect them from the rigour of the cold; they lay in holes in the snow, or under stones, and eat food raw, or previously dressed; and this is probably by no means an uncommon mode of travelling, for there is a road from *Bucher*, and particularly from the remoter provinces of that state, to *Bhaudrinath* and *Cedar*, that lies entirely behind the ranges of hills in sight from here, and of which very little has possibly ever been near the habitations of men: this is frequented by *Bhoteas* for purposes of devotion, and for the sale of salt and wool. The route adverted to in the narrative, leading along the hill of *Nagal*, and [illegible] the *Ghoorni Gunga*, is probably a path diverging from this route to *Badarinath*, and indeed it is evident that the mountains are pervaded in every direction by similar cuts, though to the eye of the traveller they appear impassible.

It is related, that about 35 years ago, a band of 4 or 500 men, from *Bharaseu*, and the remoter parts of *Garrhwal*, made an incursion through the hills into the Chinese territory, with a view to plunder. I could obtain no particulars relating to their route, or to the time it occupied; but they effected their purpose, bringing back a good many sheep. If this be a fact, it corroborates the idea that there are many more passes through the *Himalaya* range, than have come to our knowledge, or than are generally supposed, through which it is practicable to convey at least small animals.

Further information was sought respecting these passes, and the Chinese territories, by questioning the two *Bhotias* who were brought to us at *Durali*; they were however persons from whom much could not be expected; they were poor inhabitants of a miserable village, and had never travelled much; what they did know, however, they communicated in a way that shewed they did not want acuteness, and that they understood the object we had in view in interrogating them; and being treated kindly, were well pleased to give satisfaction. They spoke a broken sort of *Hindustani*, acquired in their intercourse with the hill people, but their own language was perfectly distinct in every respect.

They stated that they were inhabitants of the village of *Ghounsek*, consisting of a few poor houses in the *pergunnah* or district of *Chapning*; the chief officer (or *subadar*, as they called him) is named CATEK. This village they state to be about one month's journey from hence, at the rate of 10 to 12 *cos* per day; but they evidently have no very definite notion of a *cos*. I suspect their journeys do not exceed 6 to 8 miles; sometimes farther, as they travel over a very difficult country, and go very slowly. They represent the road as exceedingly bad; it lies for 10 days along the bed of the *Ishkul*, tracing it to its source, which lies in a lofty hill called by them *Sanchau*; and its course is very winding, but chiefly from the eastward. Another stream takes its rise from *Sanchau*, which runs to *Bucher* [illegible] and discharges into the *Sutlej*, at a place they called *Dolbe*. The name of this stream, they call [illegible]

Chapning is a large town, situated in a plain where there is nothing but short grass; no wood of any sort. It is one month's journey from their village, in a northerly direction; one day's march, through snow and through hills, all very bad and rugged road, the rest a level plain. In the course of this journey, they pass the *Sutlej* river by a *sango* or wooden bridge; it is even then of considerable size, and it goes under the name of *Lang-gin-Thang*; but they know it to be the same stream, which, in *Bucher*, is called *Satudra* or *Sutlej*.

to pass the village, which, indeed, was a measure I meant to have adopted unasked, and therefore at once agreed to. The *pandit* also represented,

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From *Chaprang* to *Gara* is one month's journey also, the road laying in a northerly direction along a perfect grassy plain, with many shawl goats and sheep grazing on it; they are in abundance both at *Chaprang* and *Gara*. Between these two places is situated the city of *Tulling*, through which the road lies, and which they describe as large, and where a grand *Lama* resides.

It has been universally found, that the hill people exaggerate distances when asking them in *cos*, and lead one to suppose that their day's marches are very long ones, when in fact they are exceedingly short; and this frequently happens, from the exceedingly difficult nature of the country and roads that lead across it. Thus, I believe that if an average of 5½ miles be allowed for the day's journey in these difficult roads, it will be found fully equal to the truth; this would make the course of the *Yukrool* 55 miles, and the direct line probably from N. E. 60 to N. E. 80. But, as it turns much in a winding channel, and [illegible] ascends and descends, one-third may be taken from that scale, and that it [illegible] this would place the source about 37 miles to the N. E. 70 of *Bhoteemgholl*; and, following the same reckoning, the village *Chounzeah* may be double the distance further in the same direction, taking a few more miles from it, on account of greater ascents and deflexions there are to be met within a river's course—say one-third; leaving 77 miles further, or 114 from *Bhoteemgholl*. *Chaprang* is said to be another month's journey to the N. 3 of which through hills, equal to about 33—less one-third or 22. The rest being on level ground, more must be allowed; but, by their own account, they do not travel more, even on a plain, than 5 or 6 *cos*, which they call 8 miles. *Chaprang* will then be found 212 miles to the north of *Chounzeah*, and, by the same reckoning, *Gara* will be 240 miles to the north of *Chaprang*, and about 500 miles N. E. 41. 30, or thereabouts, from *Bhoteemgholl*. This is going on very uncertain data, but may, with other remarks and routes, contribute a trifle to fix some points in an hitherto little known country.

I was exceedingly anxious to obtain any information respecting the *Sutej* and its sources, and paid very particular attention to all they said relating to that river; no one was permitted to speak to, or look at them, and I myself paid strict regard that no question should be put of a nature to suggest to them what sort of answer was desired, and as every word they said was spontaneous, I have some confidence in this additional evidence to that river coming from a considerable distance to the eastward, and behind the *Himalaya* range. Their men, however, could not distinctly say where the stream was derived from.

Many questions were put to them relative to their manners and customs on peculiar occasions. Of marriage, they tell, that the bridegroom buys his wife at a great expence, according to his means, and much expenditure is made by his father in the ceremony, the father of the bride only furnishing the ornaments of the lady. It does not appear distinctly that much is given to the *Lamas* or priests, on occasions of marriage, as they do not officiate or attend them, even the sight of a woman being strictly prohibited them. Marriage contracts are entered into at all ages, from childhood upwards, but the wives are not carried away till the age of 15 or 16.

Of their dead, they say, that in their village, they throw their dead into the river, but this is entirely from poverty, for any one who can afford it, at least partly burns the body, and then commits it to the stream. At *Chaprang*, when any man of rank (any "*sirdar*") dies, his body is taken by persons appointed for the purpose, and beat and pounded, bones and all together, and made up into balls which are then given to be devoured by a very large species of *kites*, which are held very sacred, and are kept by the *Lamas*; they are fed regularly by persons (*sweepers*) appointed by the *Lama*, and

that it was not customary to approach the sacred shrine with arms of any sort, and that every one performed this last stage with naked feet. As by the general voice it was allowed, that marauding and plunder were common occurrences in this neighbourhood, I did not deem it proper or safe to go totally unarmed; but agreed, that only five men should be permitted to accompany us thus accoutred, and that I should take my own gun; but that these weapons of war should be thrown aside before we got within sight of the holy spot, and deposited in a cave near it, under a guard. I also pledged myself that no use should be made of these instruments, except in case of necessity; nor any life sacrificed either by the people or myself, from the time of our leaving the village till we returned to it; moreover, that I should not carry meat of any sort, dead or alive, along with me, but feed purely on rice and bread. They did not even suggest the putting off my shoes at the village, nor could I have done so; but I promised to throw them off when entering into the precincts of the temple, or approaching the holier places, with which they were much pleased. All the *Hindus*, including the *Gorkhas*, went from hence bare foot.

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they are much reverenced and feared by the people, who do not venture to approach them. Great expence is incurred at this ceremony, many thousand rupees being given to the *Lamas*, with a sort of rich cap, of much value. The bodies of poorer people are sometimes burned, and sometimes thrown into the river. The *Lama* appears to be held in great respect: those who fall in this regard, and who do not administer the mess of pledge of gold and gold, are punished by the *Mantra*, by which, the offender is placed under the influence of some spell, and rendered immoveable in the position he happens to be in, and becomes (as they term it) like stone or earth.

All disputes are settled by the *Raja* Gurkha, (he is probably called *raja* from being the chief person, on another occasion he was called *subadar*.) A person who kills another with a sword, is fixed to four places, and broiled with iron or brass instruments till he dies; a thief is branded in the forehead with an iron, his goods are seized by the State, and he is driven from the country.

These *Bhotias* were short stout men, with features strongly marked with the Tartarian character; high cheek bones, flat nose and face, and small eyes, the corners of which turned much upwards. They wore their hair very thick and bushy, and ending in a long plaited tail, after the manner of the Chinese. Their colour was considerably lighter than that generally remarked amongst the hill people, being a dirty yellow: their faces were much thinned, however, and wrinkled. Their clothes consisted of a gown or wrapper, of coarse brown woollen stuff, with sometimes like drawers of the stuff, very loose above, but bound very tight around the calf of the leg. The dress, figure, and general appearance, however, was exceedingly different from that of the *Pahariias* or hill people.

For rather more than two *cos*, the road lay chiefly through a wood of large firs; a little above the bed of the river, the path was good, but here and there interrupted by a bad step. At this place we ascended the projection of a rock, which closes up the valley, by a rude, but curiously constructed set of steps, formed by pins stuck into the rock, and beams and stones laid across them. The channel of the river became deep, dark and narrow, and the path a mere devious scramble, over enormous fragments of rock from above, mingled with broken pieces of trees, interlaced with tangled *jungle*, till we reached a small retired spot, beneath some fine trees, where a cool spring, and the pleasantness of the place, induce pilgrims in general to halt. The river runs below this at a depth of about 100 yards, between two walls of solid rock, in which it has hollowed itself a bed just sufficient to contain it, and of which the breadth at the upper part is nearly the same as below, and in this trough it tumbles over a succession of small falls for a considerable way. Beyond this, the road is difficult, and frequently dangerous, passing along the face of *Scaurs*, in the beds of torrents, across rocks, and over a succession of broken ground, till we reach the top of a very ugly and dangerous descent, which is said to be six *cos* from the village, and which leads immediately down upon *Bhairamghati*.

At this point the *Bhágirat'hi* is divided into two branches—that which preserves the name, coming from the eastward; while the other, of a size fully equal, joins it under the name of the *Jahnavi*, from the north-east. Both these rivers run in chasms, the depth, narrowness, and wildness of which, it would be far from easy to convey an idea of; between them, a lofty crag, equal in heighth to those that tower on either side above the torrents, is thrust like a wedge. The extreme precipitousness of all of these, the roughness of their faces, with the wood which grows near their bases, obstructed the view, and prevented the whole being comprehended at a glance; but the distant black cliffs,

topped with lofty peaks of snow, are discerned shutting up the prospect in either of the three ravines, when the clouds for a moment permit them to appear. Just at the bottom of the descent, and immediately above the junction of the two torrents, an old and crazy wooden bridge is thrown across the *Bhagirathi*, from one rock to the other many feet above its stream, and it is not till this point is reached, that the extraordinary nature of the place, and particularly of the rivers bed, is fully comprehended, and then is seen the stream in a state of dirty foam twisting violently, and with a mighty noise through the strangely hollowed troughs of solid granite, cutting it into shapes of every sort and leaping in fearfull waves over every obstacle.

The bed of the *Jahnavi* is at least equally picturesque and fully as savage, but we had not equal opportunities for seeing it; the perpendicularity and heighth of the rocky sides is perhaps greater than that of the others; this river is said to have its rise in a very lofty mountain, called *Rakestar Stah*, situated in the dominions of China, and which is 15 day's journey from hence in a direction nearly that of its apparent course from hence, viz. north east by east, I am inclined to think it is still more easterly, and by no means so distant.

Just at the wooden bridge abovementioned, there is an overhanging rock, under which worship is performed to *Bhairanji*, and a black stone partly painted red, is the image of the God, and here not only were prayers said and worship performed, but every one was obliged to bathe and eat bread baked by the brahmins, as preparatory to the great and effectual ablutions at the holy *Gangotri*.

From this place we ascended the rock between the streams, by a path more curious and dangerous than any we have met with. The

rock is too steep and perpendicular to afford any natural path, and the chief part is therefore artificially constructed in a manner before alluded to, by placing beams of wood and stones upon strong timbers driven into the fissures of the rock; thus forming a hanging flight of imperfect steps over the fearful gulf below; and as this sometimes has suffered from age or weather, and as sometimes the means of attaching it to the rock were scanty, or altogether awaiting the means of passing are as frequently so insufficient and hazardous, as to strike dread into those not much accustomed to such travelling—at times a leap is necessary to reach the next sure footing while the precipice and torrent gapes below; at others, all the support that presents itself to save you from this fall, is a ledge of the rock not three inches broad, with a slight bamboo, hung from some root above to take hold of. By this unpleasant path, we reached a spot on the first ledge of the mountain where in a thick grove of fir trees, a small temple is placed to *Bhairamji*. It is a plain white building erected by AMRA SINH T'HAPPA, who gave a sum of money to be laid out on repairs of the road and places of worship here and at *Gungotri*. Having paid our respects to this deity, we continued our road along the right bank of the river, by a path equally bad as that of one ascent, and still gradually ascending among fragments of rock and wood, which made our progress painful and dangerous.

THREE *cos* of this description of path brought us opposite the debouche of a considerable stream called *Miánki-G'had*, which tumbles down a deep ravine, through the opening of which is seen the snowy range of *Miání*, with the extensive bosom of snow that feeds the stream. Just below this, we had a view of a very singular and lofty peak called *Rudru Himála Bahin*, a prodigious spire of bare rock, the top of which was enveloped in snow. Just opposite to the stream of *Miání*, we obtained bearings, both upwards and downwards of the

rivers course, and for the first time the scite of *Gungotri*, with the spot where the river arises, was pointed out by the pundit; this last was nearly directly east. The path now became very laborious and our progress very painfull. One *cos* from *Gungotri*, and two from *Miánji-Ghát*, we reached a spot called *Patangni*, which is noted as that where the five brothers, commonly called the *Pánduwán*, BHÍM SINH, ARJUN, YUDHISHT'HIR, SAHADEO, and NAGULA, remained for twelve years worshipping MAHADEO, after his retreat from *Lanca*. After that period they left this place and ascended *Swergárohini*, a peak of the sacred hill whence the *Ganges* flows; there four of the brothers died, and their immortal parts ascended to heaven; but *Yudhish'thir*, without tasting the bitterness of death, or quitting his earthly tenement was assumed body and all. Within a gun shot of *Gangotri*, the *Cédár Ganga* a rapid and considerable stream, said to have its rise in the *Cédár* mountain 18 *cos* distant, debouches into the *Bhágirat'hi*, and the place of confluence called *Gaur Cunda* is holy, and serves as a further preparatory ablution ere *Gangotri* be approached.

THE spot which bears the name of *Gangotri*, is hid from view by the roughness of the ground, and the masses of fallen rock: so that it cannot be seen till close upon it. The hills which form the river's bed, and which the whole way from *Bhairanghát'i* are exceedingly precipitous and close, here recede a little, and without losing any thing of their savage grandeur, admit somewhat of a less confined view, and more of the light of day. Just above the debouche of the *Cédár Ganga*, the bed widens into a small shringly space, in which the river rolls with great rapidity, changing its course as the floods direct it. At the gorge of this space, a bridge is thrown across, formed of two parts, the interior ends of the beams resting on a large rock in the center; and just above this bridge, in a bay formed in this stringly space, is situated the small temple or *Mai*, dedicated to the goddess GANGA.

BHA'GI'RAT'HI. In former days, there was no temple made with hands for her worship; but within these few years, as has been observed above, the piety of AMER SINH T'HAPPA, chief of the *Gorcha* conquerors, provided a sum of money (from 4 to 500 rupees) for the erection of this small building.

THE temple now built, is situated about 15 feet above the stream and precisely on the sacred rock on which it is said *Bhagira'th* used to kneel, worshipping *Mahá Deo*; it is a small building of a square shape from 16 to 20 feet high, much in the usual form of pagodas, rounding in towards the top; it is very plain, painted white with small dull red moulldings, and surmounted with the usual round and scolloped ornaments of such places; from the eastern face of the square which is turned nearly to the sacred source, there is a small projection covered with a stone pent house roof, and in the eastern end of this, is situated the entrance to the pagoda; and just before this entrance there is placed a small pagoda shaped temple to *Bhairanji*. The whole is placed in a small enclosure, surrounded by a wall built of unhewn stone and lime, within which also there is a comfortable but small house built for the accommodation of the brahmins who come to officiate. Without the enclosure are two or three sheds constructed of wood, called *Dharm Sálas* (or charity houses) built for the accommodation of Pilgrims who resort here; and there are many caves all around, formed by overhanging stones, which yield a shelter to those who cannot find room in the sheds.

THE scene in which this holy place is situated, is worthy of the mysterious sanctity attributed to it, and the reverence with which it is regarded. There is not here the confined gloomyness of *Bhairanghat'i*; the bare and peaked cliffs that rise to the sky, yield not in ruggedness

er height to any we have seen, their ruins lie in wild chaotic masses on their sides; more scanty wood relieves their nakedness; even the dark pine more rarely roots itself in the deep chasms which time has worn. Thus on all sides is the prospect closed, save in front to the east, where from behind a mass of bare rocky spires, four huge lofty snowy peaks arise. These are the peaks of *Rudra Himala*.

The first and most natural object of enquiry, after casting a glance over the general landscape, is to ascertain whence the river springs. Here, as at *Jemnotri*, we were told, that no mortal has, or can go further in its bed towards its source, than this spot; and this difficulty is indeed sufficiently apparent. I made a trial to gain a point about twelve furlongs off, beyond the temple, for the purpose of observing the course of the river, and of seeing *Gangotri* in another point of view; but having, with considerable difficulty, made my way for some distance over the unsteady fragments, at the risk of being precipitated into the stream, I was forced to turn back; beyond that point, the precipices descend more abruptly to the water's edge: and, in all probability, it would be nearly impossible to make way along their faces. Crossing the stream, to take advantage of the easier places that may occur on either side, is out of the question: it is too large and rapid; and climbing higher up the mountain side is equally so, for the crags increase in ruggedness and steepness till they end in snow. It may be, that enterprising persons remaining at this spot for several days or weeks, might explore or form a path towards the source, for time and patient perseverance can do much, and has in fact, formed the path hither; but I am convinced not only of the difficulty of the thing itself, but that it would not be easy to overcome the reluctance of the hill people to ascend, whose assistance would be so necessary to strangers, and whom superstition and religious prejudice have hitherto kept below.

The source is described as about 3 miles horizontal distance from the temple, in a direction nearly S. E. 85; and it is, in all probability, chiefly supplied by the melting of the great bosom of snow that terminates the valley, and lies between the peaks of the mountain spoken of above. This mountain, reckoned the loftiest and largest of the snowy range in this quarter, and probably yielding to none in the whole *Himála*, obtains the name of *Rudra Himála*, and is supposed to be the throne or residence of MAHA'DEO himself. It has five principal peaks called **Rudra Himála, Brahmápuri, Vishnupuri, Udgári, Canká*, and *Swergárohini*. These form a sort of semicircular hollow, of very considerable extent, which is filled with eternal snow; from which, and from the various ravines of this hollow, the principal part of the stream flows. Probably there may be smaller hollows to the right above *Gangotri*, which supply a portion. Such is the amount of the pundits account, and I believe it to be consistent with truth, for the following reasons. Our ascent from the village of *Suc'hi*, which is itself high among the hills, has been great, and from *Durali*, rapid; so much so as to leave no doubt that this spot is far elevated above the level of the countries beyond the snowy hills, indeed our perpendicular distance from the snowy region was very inconsiderable, and were it not that the heat of the place is increased by the confinement of the suns rays, and their reflexion from so much rock, it is probable that snow would continue lying here continually. The cold consequently is great here at night. The river *Setlej* certainly comes through the *Himála* range; but when we were upon its banks, and at a very considerable distance within the range of snow, it was a long days journey, or probably equal to 12 miles of regular gradual ascent from the river to the region of snow, and the heat both night and day was intolerable; nay at *Serán*, 3 miles above its bed the cold was

* It also bears the name of *Pancb Parbat*, from its five peaks, and *Suméru Parbat*, which must not be confounded with that springing from *Bundarpuch'h*, and sometimes the general appellation of *Gaildi* is given.

inconsiderable. It might then be allowed that the difference of altitude indicated by these circumstances is a strong presumptive proof that the *Bhágirat'hi* does not come through the snowy range, but rises in them.

If it does not come through the *Himálaya*, its course cannot be far from hence. The snowy peaks extend to no great breadth; they generally consist of one lofty ridge cut into high peaks and deep ravines, and project several equally irregular ridges on either side towards the north east and south west; these inferiour ridges are never equal in height to the parent mountain, but nevertheless at times shoot up masses of great magnitude, whence in their turn diverge other mountains that either themselves or by their branches reach the plain.

The breadth of the mountainous region may probably occupy a space of from eighty to one hundred miles: the grounds for supposing this to be the extent of that space, are not only our own observation, but the information we have received from different and intelligent persons, relative to routes through the passes.* Thus reasoning from probabilities, observation and information, *Rudra Himále* is at least removed to the center of the snowy range, and it is fair to conclude that the land, mountainous and elevated as it is, rather falls than rises to the north and north east of this mountain. This is confirmed by the pundit, and those zemindars who have been accustomed to view the country from lofty situations on either side of the glen of the *Bhágirat'hi*. No one seemed in the least to doubt the fact, that the river had its rise in the aforesaid hollow of snow; and some went so far as to assert that, when climbing in search of stray sheep, they had seen the glen of the river ending thus, and could discern the deep ra-

* In the *Hári Mara* [illegible], after passing *Badrinath* which is about the center of elevation, there is to be the highest elevated spot on that road, the plains are reached in three days.

vine through which it trickles down into its bed from the snowy bason: and further declare that no very considerable stream appeared to join it from any other quarter. The road before adverted to, by which the *Bisheher* men go to *Cédar* for salt, proceeding behind this mountain was quoted by the pundit as a proof, that the river did not come from a greater distance, and he mentioned several corroborating accounts given by *Bhotias*, who had travelled much in this quarter.

To all this may be added, that the stream of the *Bhágirat'h*, though large and rapid, is perhaps not greater than may be accounted for by the large mass of snow that supplies it, acted on by rain and sun, at a time of year when both have greatest effect; and that few streams of any consequence join it above the *Tahrieol*; the *Sheori-Gad'h*, the *Miáni Gád'h*, the *Bougi Gád'h* and the *Cédar Gangá*, being the only ones from the south east, while from the north west side, not a single stream larger than a mere rill, falls into it; all of which renders it probable, that few if any *nullahs* unite with the river above *Gangotri*, and that it really is formed as above described.

It has been said, that the appearance of the bed of the river and hills closing up our view confirmed the information we received. About two furlongs beyond *Gangotri*, a point on the left from the northward shuts out the immediate view of the stream; beyond this, probably about one mile, (or less of horizontal distance) a point from the southward stretches down behind the former, hiding a larger and higher portion of the bed and sides; beyond this the course is to all appearance straight for a considerable way to the southward of east, and a very rough craggy ridge shooting into sharp points forms the eastern bank, and ends in a point, round which the river again appears to turn, and which stretches down from *Swergárohini*.

SWERGA'ROHINI is the nearest of the five peaks, and forms the western point of the great snowy hollow. *Rudra Himála*, forms the eastern point: but from it a great shoulder runs down to the south westward, that as far as we could judge gives off, or ends in the mountains we are surrounded with, and forms a great unbroken though unequal snowy ridge, that bounds and confines the glen of the *Bhágirat'hi*.

THE other peaks mentioned above form different points in the back of this immense hollow, and all together compose one of the most romantic as well as largest mountains, perhaps in the world. The above discussion and explanation may seem tedious and excessive; but when the object is to throw every possible light on even the remotest, and least important part, of the course of this venerable river, tedousness may perhaps be pardoned.

THE old popular idea, that the *Ganges* issues from a rock like a cow's mouth, *(Gae Muk'h)* did not fail to occur to me, and enquiries were made into the origin of this fable. When it was mentioned, the pundit laughed and observed, that most of those pilgrims who came from the plains put the same question in several shapes; one asking whether it did not take its rise from the leaves of a sacred birch, *(Bhojpatr;)* others from its roots: and others again supposing, that the stream really and visibly came down from heaven. But he gravely assured us that no such thing happened, and that the river, in truth, came from the snow as above mentioned. He then gave the account above detailed, adding, that it was the true one given in the *Sás't'ras*, and that he was convinced of its correctness not only for that reason, but (shewing the landscape before us, and pointing to the five peaks, as in evidence of what he advanced,) because, as might be seen, it could not well be otherwise.

So far as the people of the place—pundit, brahmins, and zemindars were questioned, merely about their own district and the places contiguous, their answers were distinct and prompt, with every appearance of being correct to the best of their apprehension. But when any attempt was made to carry them further abroad, or to collect any thing of the topography of the country beyond this great range, they failed altogether: either at once saying they knew nothing about the matter, or giving improbable inconsistent accounts. Some of them asserted, that there was a plain and well cultivated country at no greater distance than 12 *cos* (horizontal distance) from the other side of *Rudra Himala*; but, from the nature of the country it was not possible to reach it, except by a very circuitous route. But whether they alluded to the great plains of *Tartary*, or to some intervening valley, it was impossible to discover. They however asserted that it might be seen from some of the high peaks in the neighbourhood, which I must believe to be false, or at best very doubtful: as I think there cannot be any means of ascending a point high enough to afford such a view from any place near this spot.

From the time we entered the bed of the river above *Suc'hi* one species of stone has chiefly predominated. A hard white stone pervaded more or less with black spots, streaks and stains, and frequently with mica; the structure is remarkable, and though the colour, the composition, and proportion of the ingredients vary, still it is quite the same stone: I am much inclined to believe it is a sort of granite.† It is much like that stone first met with in the *Paber's* bed, though in general

* If such a plain do exist, it cannot well, I think, be near the great plains on the N. E. and E. of the *Himalaya*, as the routes we have obtained from more creditable authorities, imply the existence of a far greater extent of hills stretching even to the southward of *Kemaon*. The plain was reported, I think, to be directly behind the *Cilas* mountains, which is continuous with, indeed, a part of *Rudra Himala*, and did not belong to *Garhwal*.

† This conjecture has been since fully justified, as scientific men have pronounced the specimens to be true granite.

whiter: some pieces are purely so; others spotted, with jet like particles; others with long black bars, irregularly crossing each other; some with mica in a grey bed; some with dark black or blue veins, some slightly red, some yellowish, and other specimens grey. In the river bed, from *Suc'hi* to *Durâli* it was found in large rounded irregular masses, but from that village to *Gangotri*, the whole mass of the mountains seems to be composed of it, and the bed of the river from a mile or two below *Bhairamghât'i* is formed in a solid mass through which an irregular trough has been hollowed by the continual action of the water, just broad enough for the stream to rush in a succession of falls and rapids. Its waters are quite loaded with a quantity of white shining sand, which doubtless is produced by the attrition of the stones rolled along this channel, and their gradual and constant action on the sides and bottom of this rock.

The night we arrived, fatigue was sufficient to prevent much further exertion, and combined with cold to suspend the intentions even of the pious, and a night's rest under the roof of one of the *Dharam Salas*, was very acceptable.

The whole of the next day (the 20th July,) was occupied by the people in bathing in the holy stream, and the worthy pundit made a considerable harvest from the zeal of the party; indeed, it was a matter of serious consequence and great joy to every one that had thus happily reached a place of such super-eminent sanctity, where, in fact, the act of ablution is supposed to cleanse from every sin heretofore committed; while the supposed difficulty of reaching it is so great, that few but professional devotees ever attempt the pilgrimage. It is, we find, customary for those who have lost their father or mother, to submit to the operation of shaving, and the changes this produced

on the party, were whimsical: even the mustachios were not spared; one chief means of grace, was frequently walking round the holy temple, and in this easy mode of obtaining it, it was observed that the most noted rogues were most forward—some were wonderfully indefatigable.

The outside of the temple has been before described—within, there are three images, one of them, I think, was of Cali; and the stone shelf on which they were placed, was wet and soiled with the offerings presented: a peculiar and very strong smell was perceptible, but I know not what it was; the place is, as usual in *Hindú* temples, lighted by a lamp which yielded but a sickly gleam—no daylight had admittance—no sign of riches was perceptible, either in the temple or on the person of its priest—no tinsel even glittered on the images, which were formed of black stone, and were painted. The pundit was a smart little man, cloathed like the rest of the hill people in coarse woollen cloth: he wore a red velvet cap upon his head, which had been presented to him by some pilgrim from the low country. The truth is, that though the shrine of *Gangotri* is the holiest of those to be met with in this sacred range, it is the least accessible, and consequently has fewer votaries; for those coming from the low country choose rather to take a comparatively easy road, and proceed to a more splendid and better frequented shrine, that of *Badarinát'h* which is thus far better endowed, and the officiating priests of which are in much better worldly circumstances, than those of *Gangotri*. The pundit complained much of this defalcation, which he said was partly owing to the state of the country from the *Gorc'ha* conquest: as, since that period the roads being neglected, and no provision being made for the necessary repairs, it was a matter of some difficulty to reach the shrine in safety; and this being once known, had an immediate effect in deterring even those who might else have attempted the journey.

We had now staid the full time we could afford, and had not, in fact, provisions for another day; preparations were therefore made for our return, and on the morning of July 21st, we set off for *Durâli*.

The morning was clear and lovely, and the snowy peaks of *Sumérú Parbat* shone forth in full glory, illuminated by the rising sun. Our route was the same as that we came by. Gooseberry bushes were abundant the whole way, but the fruit was small and sour. Several trees of cedar were pointed out* to us by the brahmins, but they were not abundant; it appeared the common red cedar, and is called by the natives *D'hûp*: they regard it as very sacred. Our *Hindú* attendants each carried away a little piece of it given by the brahmins.

July 22d.—About 12 o'clock we left *Durâli*, and reached the village of *Such'i*.

July 23d.—The morning was exceedingly foggy, with much drizzling rain which indeed had fallen the whole night: we left the village at 7 o'clock, and descended to the river by a steep stony path through ridges of cultivation, and crossed it by a bridge suspended upon two rocks; it is here very rapid, and enters between banks more confined, than opposite and above the village. From hence the road leads along the face of the eastern, or left bank, rough, stony and difficult, climbing up rocks when the passenger's only hold is by roots of trees, and exceedingly uncomfortable from wet. Somewhat below the bridge, we passed the debouche of *Rindi Gád'h*, which stream we crossed, descending from *Ch'hayá Cánta*.

* It appears upon enquiry, that from the time we entered *Gerwbal*, on crossing the *Meral* nullah near *Lelbinwdil*, on the first day's journey, that we have travelled entirely in *Recowar* till we crossed the pass at *Ch'hayá Cánta*, when we entered upper *Tacowar*, which occasionally was attached to *Recowar*, and sometimes formed a different *Arch*.

After a mile and half further of similar road we reached and crossed *Lotd Gadh* by a wooden bridge, a stream which has a course from *Jaundi* a snowy hill, through 5 *cos* of desart country, and is large and rapid.

The rocks here resume their stratiform appearance pointing as before to the southward, and their structure has changed. A little further on we crossed the river again on *Loárnád-ca Sango*. It here winds much, running very rapidly between the banks which approach each other close and are very precipitous and rough; the road which at first carried us clambering up and down the precipices with much toil, now winds along the foot of one of its banks.

Just below the bridge, there is a very rapid descent in the river's bed, for near a mile, in which space though there is no absolute cascade of any magnitude, yet the declivity is so steep, that the river tumbles over it the whole way, with a noise like loud continued thunder, in a mass of dirty foam: at the end of this rapid, we again crossed the river, to the left bank, by *Dalráni-ca-Sango*, which is very long, narrow, and insecure.

The road from *Loárnad-ca-Sango*, is very painful and difficult, leading entirely over the high piled ruins of the rocks above, and much tangled with thorns, while it rises and falls continually till we reach *Dangali-ca-Sango*, on which we crossed the *Bhágirat'hí* for a fourth time to-day. Just above this bridge, we saw the debouche of *Canauli Khola* above, called *Gedar Gádh*, which is, in fact, the same into which the streams from *Bansru Ghát* and *Sath-k'ar-Coth't* flow. A little below the bridge, and in a small nullah, not far above the river's bed, the village *Banghéli* is situated, and on the left bank a little further on, a small village, *Uri*, is seen, and from thence begins the *T'hát* or district

of *Cat'húr*. Two miles further carried us to a nullah called *Cúrmi-ci-Gád'h*, the bed of which we descended, to get round a high rock that projects into the river's bed; the ascent was exceedingly toilsome and dangerous, its length a mile and a half: another descent to *Elgú Gad'h*, which we crossed with difficulty, and an ascent from its bed, brought us to the village *Teár*, our resting-place for the night.

Our perambulator, which had accompanied us through the hills, became so shattered and crazy at *Durâli*, that we could make no further use of it: a considerable annoyance, as we must calculate the distance by time, and from point to point: from *Suc'hí* to *Teár* it cannot be less than 18 miles.

It was mentioned that the men of *Durâli* village were all absent when we arrived there; it was ascertained indeed, that the object of their journey was plunder, and to-day we understood, that they had actually succeeded in driving away 4 or 500 sheep and goats from the district of *Cat'húr*. Just after crossing *Dangalo Sango*, we overtook a large party of men, amounting probably to 100, armed with *axes*, bows and arrows, who, it appeared, had come from a village called *Reit'hal*, thus accoutered, to way-lay, and rob, the thieves of their booty. Their information however was too late, and the plunder was safely carried off. When questioned, they answered without the least hesitation, nor affected to conceal their intentions; when told that such misdeeds would draw on them the vengeance of government, and that probably twenty or thirty of them would be hung; they shewed neither the affectation of shame or contrition for the offence, nor fear of its

* Every *Pahari* carries an axe, called by them *Dangri*, which is small, and worn stuck in the *cummerbund* in a manner similar to that in which the *Gurkhas* wore their *Cucris*. The *Dangri* is like the *Cucri*, that weapon of the soldier, the husbandman, or tradesman—useful in all cases. Few of them had *matchlocks*; they are not originally a hill weapon, and are all imported from the plains.

punishment, nor in any way evinced a sense of the justice or injustice of the consequence pointed out to them, but coolly answered, "it is well, as the *sircar* shall please."

July 24.—The morning was chill and cloudy, but many of the snowy summits appeared on the opposite side of the river, with deep ravines streaked with snow, descending from their bosoms, carrying their streams to the river. A few small villages are seen near the river, on their skirts—*Teár* itself is small and poor; the houses are chiefly covered with grass; slate is probably scarce of a good quality, and wood is only used to cover the temples.

We left the village at half past 7; just beyond the prospect down the river opens, several villages with a good deal of cultivation appearing. A various and irregular road, passing *Shewár-ci Gad'h*, and through the wretched village of *Cúsin* led us to *Palus*, a village situate on a projecting point high above the river, upon which, and in the valley, there is much cultivation. Two miles and a half of a similar road, including another ascent and descent in crossing *Gatú Gád'h*, carried us to *Reit'hal** which is a large village and looks more thriving

* From the village of *Reit'hal*, the lower road strikes off from *Gangotri* to *Cédarnat'h* and *Badarinat'h*. The first day's journey takes the traveller to a cave called *Sheuli-ci-Uddr*, 10 *cos*, the road is tolerably good, in a southerly direction—one steep ascent.

Second day's journey to *Cat'hár*, 13 *cos*, course southerly—half ascent, half descent.

Third day's journey to *Bullang*, full 14 *cos*, direction to the east—considerable ascent and descent, but road good.

Fourth day's journey to *Powall Dunda*, a desart hilly resting-place, a cave; 16 *cos*—much ascent, but good path.

Fifth day's journey *Tarpil Narula*, 9 *cos*—3 *cos* level, 6 *cos* of descent to the eastward.

Sixth day's journey to *Gauri Cunda*, 7 *cos*—ascent and descent to the eastward. There is at this place a hot spring, which is led through a brass mouth fixed in the rock, where pilgrims bathe.

Seventh day's journey to *Cédar*, 10 *cos*—great ascent, but good road. The temple to Maha'deo is said to be of considerable size; situated very near the snow, upon a spot of level ground on the mountain, which is, in fact, a part of that called *Rudra Himlaya*—a sacred stream called *Cóli Ganga*, has its rise here, and joins the *Alacananda* at *Rudraprayág*. There are, at this place, eleven *Dharam Salas* for the use of pilgrims. From *Cédarnat'h* to *Badarinat'h*, although the distance horizontally be little, it requires eight days to go; forced marches will do it in six, three days of which are nearly entirely a return backwards; then an ascent nearly, it is said, in the same direction. The perfect impracticability of the country occasions this necessary detour.

than usual; it was from hence that the chief part of the robber band we yesterday met, issued. General smaller and larger streams now flow on either side to the *Bhagirat'hi*, the names of which it is of little importance to mention; one large one, the *Jal-Gáár* debouches opposite to *Reit'bal*. Pursuing our way we past *Notarna* and *Doár*, poor small villages, and traversed several fields of ridged cultivation, further on we passed through *Gusali*, a tolerably neat and large village, containing from 15 to 20 houses, chiefly thatched with grass. A temple covered with wood was also observed, but the Chinese appearance of the houses, the lofty towers and enormous projecting wood or stone roofs, are wearing fast away and the houses assume more of the look of common Hindoo mean huts. The wretched village of *Jacolla*, is somewhat more than 2 miles by the road, but not above one, of horizontal distance from *Gusali*, and we reached it crossing two nullahs by a stony rough and disagreeable path.

Here we rested for the night, and in very miserable accommodation; these have been found worse as we got nearer the low country, the houses are dirty, closer, and more full of vermin.

Since leaving *Teár*, our route has led through the district of lower *Tichaur*. The mountains in this day's march have lost still more of their rough savage appearance: they slope occasionally more towards their bases, and are frequently wooded far up: cultivation is more common, villages more frequent, and the predominating colours of green and yellow, give a far more cheerfull cast to a country, that however can only seem less wild by contrast with that we have left.

July 25.—The night was rainy, and the morning as usual, cold, wet, and comfortless; and we found that, through some mistake of our

guides, or our attendant KISHN SINH, we have taken a wrong road, which is considerably more toilsome than that which leads across the river from *Tear*. In the one we were about to enter on, we were informed that, considerable obstacles would present themselves from the rise of one or two large nullahs, the temporary bridges of which had been carried away by the floods. Directions were given to erect others for our passage, but the indolence and natural slowness of these people, in the common business of life, is so great, that we could place little reliance on their exertions, and we set off without any certainty of reaching *Barahat* that night.

THE manufactures of *Bisehcr* are remarkably superior to those of *Rewaen* and *Tacnaur* both in material and workmanship; the blankets and woollen stuffs of the former, are frequently of great fineness, close in texture and of considerable beauty, while those of the latter, are coarse, unsightly and bad; the wool of the former, is of a fineness equal to some of our best English wool, while the produce of the latter countries appears to partake of the character of hair, and the thread spun from it is briskly stubborn, and rather calculated to produce a coarse hair cloth, than any comfortable warm woollen fabrick; the reason of this difference, is even less explicable than that of others, and it is to be feared has its origin only in natural indolence and sloth. For pasture at all events is equally good in *Rewaen* as in *Bisehcr*, and one breed of sheep would in all probability thrive there as well as another, seeing that they succeed perfectly well in a similar climate.

THE superior state of agriculture was notorious in every district of *Bisehcr* through which we passed, and cannot entirely, though it may in some measure, be referred to the more untoward and impracticable nature of the countries now under discussion. The houses in the former are also more calculated for comfort in general than those of the

latter, though this difference is more perceptible, internally than externally.

THE circumstances in which these countries or districts are placed, though they appear to be pretty similar, differ perhaps in some points; and it is but fair to state them, as it is possible the difference of character, above remarked, may in some degree at least be referred to them.

THE *Gorkhas* have ruled in *Gerwhál* for near twelve years, previous to which a severe contest had been maintained, which drained the country of men and money. They appear to have borne in mind, in their subsequent conduct to this unfortunate State, the trouble it cost them to win it, and acted as if determined to revenge it. Its old families were destroyed; all those persons of rank and importance who were taken, were murdered or banished; its villages burnt or destroyed; and great numbers of its inhabitants were sold as slaves. The remaining part were oppressed by heavy taxes: and many voluntary banishments and emigrations took place, to avoid a tyranny too oppressive to be borne, and too powerful to be withstood. Thus, throughout great part of *Gerwhál*, the traveller sees but the ruins of villages, and the traces of former cultivation now abandoned: while, the inhabitants that remain, are, in all probability, the most ignorant and the lowest; and it may fairly be presumed, have sunk lower in exertion and mind, from the oppression they have groaned under.

THE *Gorkhas* have only succeeded in subjecting the state or province of *Bisehr*, within these 3 or 4 years past, and its subjection was far less complete than that of *Gerwhál*. The conquerors have had less time, less opportunity, and probably saw that they dared less to destroy the country and villages, or murder and disperse the inhabitants; the remoter districts they scarce penetrated into, and the certainty we trace

through the whole of *Bisheher* the marks of the *Gork'ha* violence, and the proofs of their temporary power in forts and strongholds still; the former are far less obvious than in *Gerwhál*. It may be inferred from this, that the ancient spirit of liberty and resistance is less beat down, and the mental energies less depressed in this scene of recent and somewhat milder conquest, than in that of long established tyranny.

It appears too, that *Bisheher*, even in the remotest parts, has kept up a greater and more general commercial intercourse than its neighbouring provinces; the course of the *Setlej*, passing through even its wildest districts, and communicating with the plains of *Bútan* on the one hand, and those of the *Panjab* on the other; give facilities for, and encouragements to trade, not possessed by the north western parts of *Gerwhál*. Many more persons reach the plains of *Hindustan* from *Bisheher*, and many merchants frequent it in return. Whilst, except a pilgrim to *Jamnotri* or *Gangotri*, none ever come or go to the countries in which these are situated.

At 9 o'clock we left *Jacalla*, detained till then by heavy rain, and marching a very short way along the hill face, we descended for upwards of a mile to the river's bed, by a very steep rough and slippery path, which there winds along its bank, following the inflexions of the stream, till we crossed *Sekour Gad'h*; opposite which there are three village one above the other on the other side, below them a small nullah falls into the river. Hence our road ran for a considerable distance, partly along rice cultivation, and partly along some flat table land which we now met with, a little elevated above the river bed in the hollow of each reach; passed *Jumeá-Gérh*, an old house or fort, projecting into the river on the opposite side, formerly a place of considerable sanctity, and where one of the many ablutions prescribed to the religious on the way to *Gangotri* was performed; just below,

Jamci-Gád'h empties itself into the river; somewhat further on, upon the road (still on the right side of the river) we passed the small and poor village of *Ihá* where we saw some of the largest peaches, I remember seeing either here or at home; we reckoned this place at least 5½ miles from *Jacolla*.

The path still leads along the river bank, occasionally on rice grounds and at times through thick, tangled, but small jungle to *Goárí-gád'h*, about 2 miles further on, a deep and rapid stream which we forded with difficulty and pursued our course to *Rini Gád'h*, a large and deep torrent much swelled by the rains. Over this *C'holla*, which is fully 9 miles from *Jacolla*, the zemindars had gone to place a temporary bridge. We were detained a full hour, till it was ready, and a most frail fabrick it was when finished, consisting of two small round sticks extending from the left bank to a large rock in the middle, from which, to the other bank, three similar ones tied together gave a most limber and unsteady mode of transit; such was the machine on which 50 or 60 persons, many with heavy loads were to cross a wild mountain stream: by care however, although it bent till the wood touched the stream, we succeeded tolerably well; the steadiness of these hill people in preserving their footing though heavy laden, in difficult situations, is really surprizing; only one accident happened, but it was a fatal one. One unfortunate *cooly* missed his step from the reaction of the timber, and fell into the stream; ere a hand could reach him, he was swallowed up and carried away in a moment to the junction of the nullah, with the river, about 150 yards below, where his head for a moment appeared separated from his load, but the foaming current of the *Bhágirat'hí* here tumbling over large rocks, with great noise, seized him and hurried him along with its tremendous torrent.

From the bed of *Rini Gád'h*, by a winding irregular road, we reached the top of the valley or reach, where *Barahá* is situated. At the

upper extremity on this (weſt) ſide, we paſſed the temple of *Lakſhmi*, ſacred to SIVA, and another to DURGÁ. Somewhat further on, on the oppoſite bank, is ſituate the village *Mandhal*, and a very ſhort way below it *Kilot*. *Barahát* is no great diſtance below this laſt, and is ſituated on the right or N. W. bank of the river, on a ſmall ſtripe of level land, which commences at the top of the reach, and lays at the foot of a high hill. It is a wretched place, conſiſting of five or ſix poor houſes ſurrounded with filth, and nearly buried in a jungle of nettles, thorns, and every rank weed, the produce of a dunghill; the people looked as poor and wretched as the place.

TRADITION, for it may be ſaid to amount to that, ſays, that *Barahát* was a place of note and wealth, containing 50 or 60 ſhops in its bazar, (a large number for a hill town,) and ſituated in the midſt of a rich well cultivated country, abounding in corn and cattle of all ſorts: it was alſo a place of much ſanctity, and this is the only relique of its former ſelf to be diſcerned. Even its temples, however, are in a *miſerable ſtate of dilapidation, though they ſtill abound with brahmins and fuqeers. *Dat'hatri* is ſacred to SIVA—*Murli Manur* is either the name of a temple or the deity it is ſacred to; PARSERAM has his ſhrine; and *Suc'hi-ca-Mandir* (the temple of SUC'HI,) contains the famous *Triſul* or trident. There are alſo many holy pools for ablution, as *Surj Cund*, *Brahmá Cund*, *Viſuhernath*: all formerly frequented by pilgrims on their way to *Gangotri*, whoſe worſhip and adoration there was acceptable, in proportion as they purified themſelves by frequent ablutions, at the ſacred ſtages on their upward way. Still they are frequented, but by no means as in former days; indeed, the difficulties thrown in the way of travellers during the ſway of the *Gorc'has*, and the deterioration of the roads, have rendered *Gangotri* a place of far leſs reſort than formerly. All theſe temples, bathing places, and reli-

* The Earthquake of 1803.—Aſiatic Reſearches, vol. xi. page 476.

gious buildings of every description, as well as the town itself, now present a melancholy picture of ruin and decay; even the *Dharam Sálas*, and provisions of charity, have not escaped. There were several fields and rich spots of land, attached to the temple of PARASURAM, for the purpose of feeding the pilgrims during their stay here: but they have all either been taken from it, or are laying waste.

July 26.—AFTER a most uncomfortable night and procuring the means of carriage for the baggage with considerable difficulty, we proceeded on our journey, but went in the first instance to view the temples and places worthy of notice; but in fact little remains to detain the traveller, save the trident, which is surely a curious specimen of the taste of the old time. Its three-fold composition, the elegance of its shape, and the unknown characters, that occupy much of its shaft, point it out as a singular object of admiration, interest, and speculation, for by what means it came there must I suspect remain quite an undecided point. This pillar has been so minutely described (I have understood,) by Messrs. WEBB and RAPER, that it is perfectly unnecessary to repeat here what they must have said.

AT the turn of the river forming the end of that reach in which *Barahát* is situated, there is a *jhulla* or hanging bridge of ropes, over which leads the direct road to *Srinagar*; below, the valley becomes broader, and stretches down in a westerly course for several miles.

LEAVING the *Jhulla* on our left, we wound along by a water course, carried for the purpose of irrigation from *Barahátí-ci-gád'h*, which we crossed and ascended to *Barahátí* village, about 2 miles from *Barahát*. It has been a large village and it enjoys a fine prospect over all the valley, but upon this, as on the rich cultivation and villages of this valley, the hand of desolation has fallen, and left little but ruins.

JUST about *Lakhajúrá* the *Bhágírat'hí* began to assume somewhat more of the character of a great river, spreading out into a wider channel, yet still retaining much of the impetuosity of the mountain torrent, and it sweeps in numerous windings, through this fine valley which is from 3 to 4 furlongs broad, and consists chiefly of table land, probably the bed it once ran in, and is here and there finely swelled into rises; all is cultivable, and evidently has once been under tillage, and remains of villages in various places evince a once more numerous population; all now is waste, but green and smooth.

Two or three miles from *Barahâti*, we crossed the *Rat'hor gâd'h* where we suffered considerable detention, while a temporary bridge was thrown over: somewhat further on, scrambling along the river side, we reached a smaller stream *Sinhoti-gad'h*, which we forded with much difficulty, for it was deep and strong. This nullah ends the long reach and valley, and we passed two or three bad steps, where the banks close for a short space, before entering on another, about 2 miles long, in the middle of which the village *D'hánda*, is situated, on a rock overhanging the water, about 7 miles from *Barahát*. The river flows now in a uniform course, till it is joined at the bottom of the reach by *Dhunâri-gád'h*, a large stream which flows through a valley apparently rich in cultivation. The opposite side of the river forms part of *Dhunâri* purgunnah, and there is much rice and tillage all around.

AT *Dhánda* village we left the river and ascended the hill behind it, first by a gradual easy path, along ledges of cultivation, till we turned the edge of the hill, when a succession of pretty sharp ascents and descents through fir covered hills, carried us to the village of *Petárá*, our night's stage.

THE village of *Petárá* is not much better calculated to accommodate travellers, than those we have lately passed through, poor and dirty;

but bad as the lodgings and fare were, wearinesſ and hunger made them acceptible. Our march we reckon at only 12 miles, but heat and bad roads made it toilſome.

July 27.—THE ſituation of the village is lofty, and the view from it extenſive and beautiful, particularly down the courſe of the *Bhágirat'hí*: we recognize from hence too ſeveral points, which formed objects of obſervation in our courſe up the *Jumne*, ſuch as the peaks of *Bugi* and *Marma*. Below, the *Gadul Gad'h* flows through a fine valley, and joins the *Bhágirat'hí* at *Dharaſu*: from whence, the river runs in a long and comparatively broad valley, well cultivated and ſtudded with numerous villages. Beyond, the eye ſtretches to the hills above *Athúr*, and even thoſe near *Srinagar* are to be diſcerned.

THE road from the village to *Dharaſu* is entirely deſcent; this place was formerly of ſome religious conſequence, but now is totally in ruins; it is ſituated on a rock, near the confluence of the *Gadul Gad'h* with the *Bhágirat'hí*. Juſt at the bridge by which we croſs this nullah, there is a temple to BHYRAMGURU, where two *jogis*, a man and a woman, reſide, for the benefit of pious pilgrims, who are expected to contribute to their ſupport. Riſing from the bed of the ſtream, and proceeding a mile onwards, we reached *Baret'hi* village, ſituated on a riſing ground, at the upper end of the valley: a ſhort way from hence, there is an eſtabliſhment of *jogis*, who reſide at the temple of MANGALANATH, where, there are ſome uncommonly fine mango trees, but the fruit was hardly ripe.

THERE are ſeveral villages on either ſide of the river here: thoſe on the north eaſt bank are in *Jul* pergunnah: that of *Oudepore*, commences on this ſide at *Gadul Gad'h*.

From *Barethi*, our path lay along this fine valley, pleasant and easy; the river runs chiefly on the eastern side to the debouch of the *Nagur Gád'h*, a pretty copious stream, from near *Marma-ci Dhar*. At this point, two opposite *Dhárs* approach and interrupt the range of the valley, which, however, continues to the south eastward, till shut out by intervening points from the view, though less level and fertile than that we have passed through.

At this point, we left the *Bhágirat'hi* entirely crossing the *Nagur* nullah, and ascending *Jaudagang-ci-D'hár*: on the face of this hill, we found many trees of the *Tejpat*, (*Laurus Cassia*,) the flavour of which was very good and powerful; it is the same with that tree, the leaves and skin of the roots of which forms an article of trade, from *Nepál* and the lower parts of the hills with the lower provinces, and mentioned by Colonel Kirkpatrick: it was perfectly wild and seemed tolerably abundant. Our ascent continued, chiefly through wood, occasionally along a bare hill side, and now and then along rice cultivation near small water courses passing several villages, and frequently very steep and painful till we reached *Coessu-ci-D'hár* continuous from the westward with *Marma*, and fully 4½ miles from the place where we left the river, we reckon it from 10½ to 11 from *Petárá*. The whole road was wearisome and irregular, and this gorge is very highly elevated, the wood towards the top, besides the common fir, consists chiefly of the long leaved oak, and a species of rhododendron frequently mentioned before, a very extensive view is commanded from hence, but not a peak of the snowy range was visible; deep and dark clouds rested on them.

From this gorge a steep descent commenced, at first through deep red soapy soil, and then in the bed of a stream called *Bél-ci-Gád'h*, which rises in the pass. We passed along some scanty rice cultivation, and though the miserable ruined village of *Macrora*, and reached that

of *Bhalu*, after a very fatiguing descent. It is small, but tolerably clean, and formed our place of lodging for this night. There is nothing worthy of observation here, it is one of 7 villages forming the *Bhalu* division in the *Jounpore* district.

July 28.—At 7 o'clock we left *Bhalu*, the path descending rapidly in the bed and stream of the *Bel* or *Bhal Gad'h*: opposite the mouth of this nullah, but yet a long way off *Sowac'hola-ci-Tiba*, was observed, a high hill, just above the *Dun*; the path crossing and recrossing the stream, which is large from heavy rain, was painful and unpleasant; a little below, the stream is increased by *Sinhalo-ci-Gad'h*, from a wild glen in which are situated three villages, belonging to *Bhalu* division. Still further on *Mathal Gád'h* also joins, and the whole, about 2 miles from *Bhalu*, takes a westerly direction, uniting with the *Jamli Gád'h*, which comes in a westerly direction from *Dharauli ci-Dhár*. The whole waters of the two vallies, at first under the name of the *Jamli Gád'h*, and afterwards called the *Agloha Gad'h*, flow westward to the *Jumna*.

Crossing the end of *Macrel ca-Danda*, which forms the point between the *Bél* and *Jamli-Gad'hs*, and crossing the latter stream, we began to ascend and passed through little dirty villages, *Dangolo* and *Báhimo*; these form a part of the *Das-jola* purgunnah, and the latter we reckoned 3 miles from *Bhalu*.

The hills now were green and rather bare of wood, the houses had totally lost all appearance of the *Chinese* style of building, degenerating into the common poor *Hindustani* hut. The dress of the women as well as the men, had began to change even at *Barahát*, where occasionally cotton cloth instead of blanket and woolen was observed; here cotton is the universal material of dress, sometimes coloured and checked, and the cotton skull cap is in general use.

A STEEP and hot ascent led us by the miserable village of *Gorono*, from whence the path lay on the left hand hill side to a rough wooded descent, and the bed of a dry nullah; hence a very steep zig-zag ascent brought us to the top of a heighth whence we enjoy an extensive view, and trace the whole valley we have crossed, from its rise in *Dhanauli*, nearly to its debouche at a village called *Gorh*, by the *Jumna*, where it has changed its name, from the *Agloha*, to the *Bhic-Gad'h*. The range of *Marma-ci-D'hár* forms the northern boundary of this large valley, sketching from *Jount*, and its hills, in the westward, by *Coessu* in the eastward, and forming the *Seuri* and *Dhanau i-ci-D'hârs*, and stretching to the *Bhágirat'hi*; this long range, in its course gives off many subordinate *D'hars*, which form valleys, that find a general outlet to the *Jumna* through the *Agloha-Gad'h*.

FROM this station we kept along the face of the hill, for about a mile, where turning sharp to the left a short but rough descent brought us to the village *Bélu*; this is a small and poor place, but as there are no other resting places between it, and *Nágel* in the *Deyrah Dun*, said to be a distance of 12 miles, we were forced to content ourselves with remaining for the night, and probably it was as well to give our weary people some extraordinary rest, as the march for the next day, to *Deyrah*, was described as a long and fatiguing one.

July 29.—WE rose early and got on foot by six, to encounter our day's fatigues. THE road wound along the left hand side of the hill on a rocky path formed entirely of lime stone, to the head of a valley one side of which is formed by the *Sowac'hola-ci-Tiba*; the place is called *Mugra*: it is a dark, gloomy, wooded ravine, and in it there is a perennial spring of remarkable coldness: it is one and half miles from *Bélu*. From this place, a sharp ascent brought us to a point in the crest of *Sowac'hola-*

Ganga: and all the beautiful *Dun*, and the still more lovely and fertile plains of *Hindustan*, burst full upon our view.

From hence, we obtained a short last glimpse of the snowy hills, and of the peak of *Bendrpnich'h*. *Haridwar* too was seen, and several other points we could not certainly identify.

The latter part of the descent is precipitous and rocky: from the foot of the hill, we passed along the beds of several small nullahs, which are only formed by the heavy rain, and through the thin jungle that covers the rising grounds at the foot of the hills, till we reached *Nagel*, a small village, not far in the plain; from hence the path to *Deyra* is plain and level, through cultivation and mango topes, leaving *Kalunga*, on our left. I regretted much that I could not visit this place; but neither weather nor time permitted; it is indeed too well known to need description; neither does the town of *Deyra* require to be described, and in fact having only passed through it, I could give no adequate idea of the place. It is about 6 miles from *Nagel*; the distance of *Nagel* from *Bétu*, I cannot so well determine, but am inclined to consider it at least 7 or 8 miles, so that our concluding march was at least from 12 to 14 miles.

The next morning we left the *Dun*, which was chiefly under water, by the *Keeru* pass, and reached *Saharunpore* on the night of the 30th of July.

IV.

OF THE MURDERERS CALLED PHANSIGARS.

BY DOCTOR SHERWOOD,

Communicated by Colonel McKenzie.

WHILE Europeans have journeyed through the extensive territories subject to the Government of Fort St. George, with a degree of security no where surpassed, the path of the native traveller has been beset with perils little known or suspected, into which, numbers annually falling, have mysteriously disappeared; the victims of villains as subtile, rapacious, and cruel, as any who are to be met with in the records of human depravity.

THE *Phánsigárs*, or stranglers, are thus designated from the Hindustani word *Phánsi*, (a) a noose. In the more northern parts of *India*, these murderers are called *Thugs*, (b) signifying receivers: in the Tamul language, they are called *Arí Túlúcar*, (c) or mussulman noosers: in Canarese, *Tanti Callerú*, (d) implying thieves who use a wire or catgut noose: and in Telaga, *Worlú Wahndlu* or *Warlú Vayshay Wahndloo*, (e) meaning people who use the noose.

THERE is no reason to believe that Europeans were aware of the existence of such criminals as *Phánsigárs*, until shortly after the conquest

(a) پھانسی
(b) ٹھگ
(c) [illegible]
(d) [illegible]
(e) [illegible]

Gravelot del. Blackwellia spiralis Lemaire sc.

of *Seringapatam*, in 1799; when, about a hundred were apprehended in the vicinity of *Bangalore*. They did not engage general attention; nor would it appear that they were suspected to belong to a distinct class of hereditary murderers and plunderers, settled in various parts of *India*, and alike remarkable for the singularity of their practice, and the extent of their depredations. In the year 1807, between *Chittoor* and *Arcot*, several *P'hánsigárs* were apprehended, belonging to a gang which had just returned, laden with booty from an expedition to *Travancore*: and information was then obtained, which ultimately led to the developement of the habits, artifices, and combinations of these atrocious delinquents.

The *P'hánsigárs* that infested the south of *India* a few years ago, were settled in *Mysore*, on the borders of that kingdom and the *Carnatic*, in the *Baloghat* districts, ceded to the Company by the Nizám in 1800; and they were particularly numerous in the *poliums* of *Chittoor*. The sequestered part of the country, which comprehended these *poliums*, maintaining little intercourse with the neighbouring districts, abounding in hills and fastnesses, and being immediately subject to several *polygars*, afforded the *P'hánsigárs* a convenient and secure retreat; and the protection of the *polygars* was extended to them, in common with other classes of robbers, in consideration of a settled contribution: or, which was more frequent, of sharing in the fruits of their rapacity.

It is impossible that such criminals as *P'hánsigárs*, living by systematic plans of depredation, could long remain in the same place in safety, unless their practices were encouraged or connived at by persons in authority. Hence, after the establishment of the Company's Government over the *Carnatic*, and the districts ceded by the Nizám, and the consequent extinction of the power and influence of the *Po-*

lygars, some of whom had succeeded in rendering themselves virtually independent of the former government, these murderers very generally changed their abodes, and frequently assumed other names.

While they lived under the protection of polygars and other petty local authorities, and among people whose habits were in some respects analogous to their own, it was unnecessary to dissemble that they subsisted by depredation. They and their families lived peaceably with their neighbours, whom they never attempted to molest, and between whom there subsisted a reciprocation of interest in the purchase and disposal of the plunder which the *P'hánsigárs* brought with them on returning from their expeditions. Afterwards, on the extension of the English Government, it was usual for the *P'hánsigárs*, while they continued their former practices, ostensibly to engage in the cultivation of land or some other occupation, to screen themselves from suspicion to which they must otherwise have been obnoxious.

P'hansigars never commit robbery unaccompanied by murder, their practice being first to strangle and then to rifle their victims. It is also a principle with them to allow no one to escape of a party, however numerous, which they assail, that there may be no witnesses of their atrocities. The only admitted exception to this rule is in the instance of boys of very tender age, who are spared; adopted by the *P'hánsigárs*; and, on attaining the requisite age, initiated into their horrible mysteries.

A gang of *P'hánsigárs* consists of from ten to fifty, or even a greater number of persons; a large majority of whom are Musselmans: but Hindus, and particularly those of the Rajput tribe, are often associated with them; Bramins, too, though rarely, are found in the

gangs. (f) Emerging from their haunts, they sometimes perform long journeys, being absent from home many months, and prowl along the eastern and western coasts to *Hyderabad* and *Cape Comorin*. In general, however, they do not roam to such a distance; but make one or two excursions every year. Their victims are almost exclusively travellers whom they fall in with on the road. Each gang has its *sirdar* or leader, who directs its movements. Of a numerous gang some usually remain at home, while the rest are engaged in the work of pillage and murder. Those that are abroad are often divided into separate parties of ten or fifteen persons; who either follow each other at some distance, or, the parties taking different routes, they rendezvous at an appointed place in advance; measures being at the same time taken to secure a speedy junction of the gang, should this be requisite for the purpose of attacking several travellers at once. Different gangs sometimes act in concert, occasionally apprising one another of the approach of travellers whose destruction promises a rich booty.

P'HA'NSI'GA'RS have the appearance of ordinary inoffensive travellers, and seldom assume any particular disguise. They indeed not unfrequently pretend to be traders; and there is reason to believe, that they sometimes come from the *dekhin* clothed in the garb of *bairagis*. Formerly, when *P'hansigary* was practised to a greater extent, and in a more daring manner than at present, the leader, especially if enriched by former spoliations, often travelled on horseback, with a tent, and passed for a person of consequence or a wealthy merchant: otherwise, he appeared at first in a more humble character, and assumed in the course of his rapacious progress one of more importance, as he became possessed of horses and bullocks; which, while they afforded him carriage for the plundered property subserved the purpose of giving countenance and support to his feigned character.

(f) Brahmins, it is probable, do not assist in the actual perpetration of murder, but are employed to procure intelligence, in obtaining which their peculiar privileges afford them great facilities.

PHANSIGARS are accustomed to wait at choultries on the high roads, or near to towns, where travellers are wont to rest. They arrive at such places and enter towns and villages in straggling parties of three or four persons, appearing to meet by accident and to have had no previous acquaintance. On such occasions, some of the gang are employed as emissaries to collect information, and especially to learn if any persons with property in their possession are about to undertake a journey. They are often accompanied by children of ten years of age and upwards; who, while they perform menial offices, are initiated into the horrid practices of the *Phansigars*, and contribute to prevent suspicion of their real character. Skilled in the arts of deception, they enter into conversation and insinuate themselves, by obsequious attentions, into the confidence of travellers of all descriptions, to learn from them whence they come, whither and for what purpose they are journeying, and of what property they are possessed;—thus,

> " —— under fair pretence of friendly ends,
> And well placed words of glozing courtesy,
> Baited with reasons not unplausible,
> Wind them into the easy-hearted man,
> And hug him into snares.

When the *Phansigars* determine, after obtaining such information as they deem requisite, to attack a traveller, they usually propose to him, under the specious plea of mutual safety, or for the sake of society, to travel together; or else they follow him at a little distance, and, on arriving at a convenient place, and a fit opportunity presenting for effectuating their purpose, one of the gang suddenly puts a rope or sash round the neck of the unfortunate person, while others assist in depriving him of life.

Two *Phansigars* are considered to be indispensably necessary to effect the murder of one man, and commonly three are engaged. There is some variation in the manner in which the act is perpetrated, but the following is perhaps the most general. While travelling along, one of

the *Phánsigárs* suddenly puts the cloth round the neck of the person they mean to kill, and retains hold of one end, while the other end is seized by an accomplice; the instrument crossed behind the neck is drawn tight, the two *Phánsigárs* pressing the head forwards, at the same time the third villain, in readiness behind the traveller, seizes his legs, and he is thrown forward upon the ground. In this situation he can make little resistance. The man holding the legs of the miserable sufferer, now kicks him in those parts of the body endowed with most sensibility, and he is quickly dispatched.

Antecedently to the perpetration of the murder, some of the gang are sent in advance and some sent in rear of the place, to keep watch and prevent intrusion by giving notice, on occasion, to those engaged in the act. Should any persons unexpectedly appear on the road, before the murdered body is buried, some artifice is practised to prevent discovery, such as covering the body with a cloth while lamentations are made professedly on account of the sickness or death of one of their comrades: or one of the watchers falls down, apparently writhing with pain, in order to excite the pity of the intruding travellers and to detain them from the scene of murder.

Such are the perseverance and caution of the *Phánsigárs* that a convenient opportunity not offering, they will sometimes travel in company with, or pursue persons whom they have devoted to destruction, several days before they execute their intention. If circumstances favor them, they generally commit murder in a jungle or in an unfrequented part of the country, and near to a sandy place or a dry water course. A hole three or four feet in depth, in such a spot, is dug with facility; in which the body being placed, with the face downwards, it is shockingly mangled. Deep and continued gashes are often made in it in both sides, from the shoulders to the hands and to the feet, which lay open

the abdomen, and divide the tendon at the heel. Wounds are also made between the ribs into the chest; and sometimes, if the hole be short, the knees are disjointed and the legs turned back upon the body. The hole is then filled with earth. The body is thus cut and disfigured to expedite its dissolution, as well as to prevent its inflation; which, by raising or causing fissures in the superincumbent sand, might attract jackals, and lead to the exposure of the corpse. When the amount of the property is less than they expected to find, the villains sometimes give vent to their disappointment in wanton indignities on the dead body.

If, when a murder is perpetrated, a convenient place for interring the body be not near, or if the *P'hánsigárs* be apprehensive of discovery, it is either tied in a sack and carried to some spot, where it is not likely to be found, or it is put into a well; or, which is frequently practiced, a shallow hole is dug, in which the corpse is buried, till a fit place for interring it can be discovered; when it is removed and cut in the manner already mentioned. If the traveller had a dog, it is also killed; lest the faithful animal should cause the discovery of the body of his murdered master. The office of mangling the dead body is usually assigned to a particular person of the gang. The *P'hánsigárs* are always provided with knives and pickaxes, which they conceal from observation.

From the foregoing account it will be obvious, that the system of the *P'hánsigárs* is but too well adapted for concealment. The precautions they take, the artifices they practice, the mode of destroying their victims, calculated, at once, to preclude almost the possibility of rescue or escape—of witnesses of the deed—of noise or cries for help—of effusion of blood—and, in general, of all traces of murder;—these circumstances conspire to throw a veil of darkness over their atrocities.

I now proceed to notice various particulars, more fully illustrating the practices, habits, and character of these criminals.

It is not improbable that formerly a long string, with a running noose, might have been used by *P'hánsigárs* for seizing travellers, and that they robbed on horseback. But, be this as it may, a noose is now, I believe, never thrown by them from a distance, in this part of *India*. They sometimes use a short rope, with a loop at one end; but a turban or a *dot'hí*, (a long narrow cloth, or such worn about the waist,) are more commonly employed; these serve the purpose as effectually as a regularly prepared noose, with this advantage, that they do not tend to excite suspicion. When such a cloth is used, it is, previously to applying it, doubled to the length of two, or two and a half feet, and a knot is formed at the double extremity; and about eighteen inches from it, a slip knot is tied. In regulating the distance of the two knots, so that the intervening space when tightly twisted, may be adapted to embrace the neck, the *P'hánsigár* who prepares the instrument tries it upon his own knee. The two knots give the *P'hánsigárs* a firm hold of the cloth, and prevent its slipping through their hands in the act of applying it. After the person they attack has been brought to the ground, in the manner already described, the slip knot is loosed by the *P'hánsigár* who has hold of that part of the cloth, and he makes another fold of it round the neck; upon which, placing his foot, he draws the cloth tight, in a manner similar to that (to use the expression of my *P'hánsigár* informer,) "of packing a bundle of straw."

Sometimes the *P'hánsigárs* have not time to observe all the precautions I have mentioned in cutting and interring a body; apprehension for their own safety inducing them to leave it slightly buried. Sometimes, also, when a murder is perpetrated in a part of the country

which exposes them to the risk of observation, they put up a screen, or the wall of a tent, and bury the body within the inclosure:—pretending, if enquiries are made, that their women are within the screen. On such occasions these obdurate wretches do not hesitate to dress and eat their food on the very spot where their victim is inhumed.

If, which scarcely ever happens, a traveller escape from the persons attempting to strangle him, he incurs the hazard of being dispatched by one of the parties on watch. Should he finally escape, or should any other circumstance occur to excite alarm, or apprehensions of being seized, the gang immediately disperses; having previously agreed to re-assemble at an appointed time, at some distant place.

Travellers resting in the same choultry with *P'hánsigárs* are sometimes destroyed in the night, and their bodies conveyed to a distance and buried. On these occasions a person is not always murdered when asleep; as, while he is in a recumbent posture, the *P'hánsigárs* find a difficulty in applying the cloth. The usual practice is first to awaken him suddenly with an alarm of a snake or a scorpion, and then to strangle him.

In attacking a traveller on horseback, the *P'hánsigárs* range themselves in the following manner. One of the gang goes in front of the horse, and another has his station in the rear: a third, walking by the side of the traveller, keeps him engaged in conversation till, finding that he is off his guard, he suddenly seizes the traveller by the arm and drags him to the ground; the horse at the same time being seized by the foremost villain. The miserable sufferer is then strangled in the usual manner.

Against *P'hánsigárs* it must be obvious, that arms and the ordinary precautions taken against robbers, are unavailing. When a person is

armed with a dagger, it is usual for one of the villains to secure his hands. It sometimes happens, that a party of travellers, consisting of several persons, and possessed of valuable effects, are, while journeying in imaginary security, suddenly cut off; and the lifeless and despoiled bodies being removed and interred, not a vestige of them appears. (g) Instances are said to have occurred, of twelve and fourteen persons being simultaneously destroyed. But such occurrences must be rare; and, in general, the property taken is not considerable. Such, indeed, are the cruelty and cupidity of these detestable wretches, that, on the presumption of every traveller possessing concealed treasure, or some property, however trifling, even indigence affords not its wonted security.

Formerly, if good horses, shawls, or other valuable articles, were among the booty, they were commonly reserved for the *polygár*, in payment of protection. A portion of the plunder was usually appropriated to defraying the expences of religious ceremonies; and, sometimes, a part was also allotted for the benefit of the widows and families of deceased members of the gang. The residue of the booty, being divided into several parts, was usually shared as follows:—to the leader, two shares; to the men actually concerned in perpetrating the murder, and to the person who cut the dead body, each one share and a half; and to the remainder of the gang each one share. The plunder was almost always carried home by the *P'hánsigárs* and sold greatly below its value:—it was never disposed of near to the place where the per-

(g) Near *Salem*, about ten years ago, three *gulab* poons were killed, having on them money in different coins, to the amount of 16,000 rupees. In 1805, five persons were killed in *Coimbatore*, and cash to the amount of about 2,500 pagodas, the property of the collector of the district, was taken. In the same year, two respectable natives, proceeding on horseback from *Madras* to the *Malabar* coast, with five attendants, were all killed. In 1807, five persons, besides two others who had joined them on the road, were killed near *Rasipolur*, and robbed of property to the amount of 1,000 pagodas, belonging to an officer of engineers. And, in 1815, three persons were killed in the district of *Masulipatam*, and 2,500 rupees taken.

son to whom it belonged was murdered, nor where it was likely to be recognized, of which the *P'hánsigárs* were enabled to judge by the information imparted to them by the credulous sufferers.

The frequent association of the most abject superstition, with the deepest guilt, has been often noticed. The justness of the observation is exemplified in the conduct of most—perhaps of all—classes of *Indian* delinquents, and remarkably so in that of the *P'hánsigárs*. Their system indeed, seems to be founded on the basis of superstition. They pay the most servile regard to omens; and they never leave their abodes to go on an expedition, without a previous persuasion, derived from modes of devination in use among them, that it will be attended with success. Though the *P'hánsigárs* are almost all *mussulmans*, they have nevertheless universally adopted, on certain occasions, the idolatrous worship of *Hindu* deities. CALI or MARRIATTA, (the goddess of small-pox of the *Carnatic*,) is regarded as their tutelary deity, and is the object of their adoration. She is usually invoked by them under the names of JAYI, or AYI, and of TULJAPURI. (*b*) Before an expedition is determined on an entertainment is given, when the ceremony of sacrificing a sheep to JYU is performed; and though perhaps not always, yet it would seem generally, in the following manner. A silver or brazen image of the goddess, with certain paraphernalia pertaining to her;

(*b*) Colonel COLIN MACKENZIE, so well known for his successful researches into *Indian* history and antiquities, observes, in a letter to me, "that it was the custom of many of the ancient houses of families, that have raised themselves by depredation to rank and power, to conciliate CALI; hence the sacrifices of human kind, of offerings of *nefra*, and ultimately of sheep by the Rajahs of *Mysore*; and now the commutation of cocoanuts at the hill of *Mysore*, which derives its name from MARRI-ALURA MARDANA, another name for CALI.

"At *Chitaldroog* also the ancient *Polygars* worshipped and sacrificed to CALI; and even still at *Tuljapuri* on the western ghauts, 300 miles west of *Hydrabad*, on the road to *Poonah*, I was there in March 1797. It is a celebrated temple of CALI, where the pooja is performed by a low tribe and not by brahmins, who abhor the sacrifices. It is even so much suspected that infamous rites and human victims were offered there, that my head brahmin (the late *Raja Beriah*) horror-struck by the occasions he witnessed, urged my departure from *Tuljapur* and was not easy till we got away."

and sometimes, also, one of GANE'SA; and the images of a lizard and a snake, reptiles from which presages are drawn; together with the implements of *P'hánsígárs* as a noose, knife, and pickaxe, being placed together flowers are scattered over them, and offerings of fruit, cakes, spirit, &c. are made; odoriferous powders are burned, and prayers are offered for success. The head of the sheep being cut off, it is placed, with a burning lamp upon it and the right fore foot in the mouth, before the image of JAYI, and the goddess is entreated to reveal to them whether she approves of the expedition they are meditating. Her consent is supposed to be declared, should certain tremulous or convulsive movements be observed, during the invocation, in the mouth and nostrils, while some fluid is poured upon those parts. But the absence of those agitations is considered as indicating the disapprobation of the goddess, and the expedition is postponed.

About ten or twenty days afterwards, the ceremony is repeated; and, if auspicious inferences be drawn from it, the *P'hánsígárs* prepare to depart. But before they determine towards what quarter to proceed, some persons of the gang are sent on the high road, in the direction they wish to take, to observe the flight of crows and other birds, and to listen to the chirping of lizards. Should success be betokened, the same path is taken. If the signs be adverse, the *sirdar* sends some of the gang to make observations on another road, or at a place where two roads meet; and these votaries of superstition proceed in that direction, which promises, as they infer, the best success.

In the course of their progress, they observe the same scrupulous regard to omens. Emboldened by favorable ones, they are greatly discouraged by those of an opposite tendency. If they have now proceeded far from home, when unlucky signs are descried, they regard

them as premonitions to return:—under other circumstances they either perform certain ceremonies, or they halt for a few days, till the malignant influence, denoted by them, is supposed to be passed; or else they bend their course in a different direction. To the intervention of bad omens, a traveller, over whom destruction was impending, is sometimes indebted for his safety. *(i)*

On returning also from a successful expedition, ceremonies are performed to Jayr.

The *P'hánsigárs* keep the *Hindu* festivals of the *Dípávali* and the *Desserah*, which they celebrate in a manner similar to that observed among *Hindus*.

A tradition is current among *P'hánsigárs*, that about the period of the commencement of the *Cali Yug*, Mariatta co-operated with them so far, as to relieve them of the trouble of interring the dead bodies, by devouring them herself. On one occasion, after destroying a traveller, the body was, as usual, left unburied; and a novice, unguardedly looking behind him, saw the goddess in the act of feasting upon it, half of it hanging out of her mouth. She, upon this, declared that she would no longer devour those whom the *P'hánsigárs* slaughtered; but she con-

(i) It would be tedious to enumerate all the omens by which they allow themselves to be influenced in their proceedings. I shall briefly mention a few of both kinds—prosperous and adverse.

The following are favorable signs:—A lizard chirping, and a crow making a noise on a living tree on the left side. A tiger appearing is deemed rather a good sign. The noise of a partridge on the right side, denotes that they will meet with good booty on the very spot, and they, therefore, are accustomed to make a halt.

These betoken misfortune:—A hare or a snake crossing the road before them. A crow sitting and making a noise on a rock or a dead tree. An ass braying while sitting. An owl screeching. The noise of a single jackal. If a dog should carry off the head of a sheep which they have sacrificed, they consider it to betoken that they will get no booty for many years.

descended to present them with one of her teeth for a pickaxe, a rib for a knife, and the hem of her lower garment for a noose, and ordered them for the future, to cut and bury the bodies of those whom they destroyed.

White and yellow being considered the favorite colors of their patroness, and those in which she is arrayed; the cloths for strangling are of one or other of those, to the exclusion, I believe, of all other colors.

Ridiculous as their superstitions must appear, they are not devoid of effect. They serve the important purposes of cementing the union of the gang; of kindling courage and confidence; and, by an appeal to religious texts deemed infallible, of imparting to their atrocities the semblance of divine sanction.

To the ascendancy of the same superstitious feeling is also to be ascribed the curious circumstance that *P'hánsigárs* are accustomed to refrain from murdering females, and persons of the *Camála* cast; which includes gold, iron, and brass, smiths, carpenters, and stone-cutters.) Washermen, potmakers, pariahs, chucklers, lepers, the blind and mutilated, a man driving a cow or a female goat, are also spared. These persons appear to be regarded either as the descendants or servants of Jayi; as her constant worshippers; or as having claims to the especial protection of the goddess, and are for these reasons exempted from slaughter.

When this rule is respected any one of these persons, travelling with others of different casts, proves a safeguard to the whole party; the same principle which prompts the *P'hánsigárs* to destroy every individual of a party, forbidding them to kill any unless the whole.

MANY *P'hánsigárs*, who have become informers, have declared that they never knew any of the abovementioned persons to have been destroyed, and conceived that no pecuniary temptation could be sufficiently powerful to occasion a violation of the rule. Others have stated that they had *heard* of a gang of *P'hánsigárs* who, having murdered a woman, never afterwards prospered, and were at length destroyed. Notwithstanding the reasons for acquiescing generally in the truth of the statement, that women, and men of particular castes, are spared, the following occurrences, in the latter of which not fewer than nine persons disappeared, and who were almost beyond doubt murdered by *P'hánsigárs*, shew that their religious scruples on this point are, when the temptation is great, at least sometimes overcome.

IN the latter end of 1800, MOHAMED ROUS, the subadar who commanded the escort of the Resident of *Mysore*, being ordered to join the force then forming against the southern *Polygars*, sent some of his family, among whom were two, if not three, women, to *Madras*. They were never heard of until June 1801; when a man was seized at *Bangalore* having in his possession a bullock which was recognised to have belonged to MOHAMED ROUS. This man was a *P'hánsigár*; and gave a clear account of the murder, by a gang to which he belonged, of the subadar's family.

THE wife of KISTNA ROW, in company with his nephew, and attended by a bramin cook, two female servants, two private peons, and two *coolies*, set out from *Poonah* with four horses to join KISTNA ROW, then at *Nagpúr*. They had nearly completed their journey, having arrived at a village about fifteen miles from the place of their destination, and sent to apprize KISTNA ROW of their approach. Two persons were sent by him to conduct the party to *Nagpúr*; but subsequently to the departure of the travellers

from the village abovementioned no intelligence could be obtained—no traces whatever could be discovered of them; and though about four years have since elapsed, all enquiries have been fruitless. (k)

The utility to such criminals as *Phansigars* of signs, and of words and phrases not understood by others, as channels of communication must be obvious. It is accordingly found that several such are employed by them. Some of those in more frequent use I shall mention; and the catalogue might have been easily extended.

Drawing the back of the hand along the chin, from the throat outwards, implies that caution is requisite—that some stranger is approaching. Putting the open hand over the mouth and drawing it gently down implies that there is no longer cause for alarm. If an advanced party of *Phansigars* overtake any traveller whom they design to destroy, but have need of more assistance, they make certain marks on the road, by which those of the gang who follow understand that they are required to hasten forwards. A party in advance also leaves certain marks where a road branches off, as intimations to those who follow of the route their comrades have taken.

The following list comprehends several slang terms and phrases in use among them. This language they denominate *Pheraseri-ci-bôli*; or, as the term may be rendered, the language of dispatch or emergency.

(k) I have stated that nine persons were out of us this occasion, though there is some reason to believe that the party consisted of even a greater number.

Kistna Rao had been formerly employed in the confidential situation of Shirishtadar under Colonel Read, when his gentlemen held the Collectorship of the territories ceded by *Tippoo* on the conclusion of the war of 1795. He afterwards served under Colonel Close at the Residency at *Poonah*, where he is still employed by the British Government.

Yeká	one
Bítri	two
Sancód	three
Wodlí	four
Panchúrú	five
Serú and Cherú	six
Sat'húrú	seven
Desrú	ten
Máhí	one hundred
Hácádé	one thousand
Doácadé	two thousand
Defacádé	ten thousand
Sitcalé	pagoda
Burcé	rupee
Chiltá	fanam
Sitac	gold
Cawúdga	silver
Cúrp	a horse
Cúrpání	a mare
Newála	sheep
Lamcání	a hare
Móz (*per*)	bullock
Agání	turban
Raclán (*per*)	jackal
Comuda (*h*)	cock
Comudí (*h*)	hen
Sondrí	coral
Pandúr p'hálí	pearl
Shaic'h-jí ór Mohamed Khan	musselman stranger
Bhítú	hindu ditto
Cantger (*per*)	watcher
C'halcári	intelligencer
Worawal	persons appointed to seize horsemen
Mahí	pickaxe
Cát'hiní	knife for cutting the dead body
Rumál	a handkerchief worn as a turban
Canchá (*h*) D'hotí (*tel*)	sash
Newár (*h*)	tape
Nár Muctem	
Sir-ghant	chief knot
Der-ghant	1½ or slip knot
Mán	a convenient place for murdering
Cónt	name of an entertainment given by *P'hánsigárs* to their friends

Literally	*P'hánsigár* acceptation
Nyamet — A delicacy	A rich man
Lacra — A stick	A man of no property
P'hankaná	Ditto

Dhol .... A barber's drum .... An old man

Man [illegible] do .... Sweep the place .... See that no person is near

Kanta pante láo .... Bring firewood .... Take your allotted posts

Pán ká rumal nícálo Take out the handkerchief with the beetle. Get out the doti, &c.

Pan Khaó .... Eat beetle .... Despatch him.

Kotá cero .... Implies a slight burial, with the face downwards, the body whole, and covered only with sufficient earth to conceal it.

Kedbí Gidbí, Dekho, Look after the straw. Look after the corpse; that is, the *Phansigars* proceed to a village after the slight burial, and send out the appointed persons to bury the body properly, keeping watch that no person is looking.

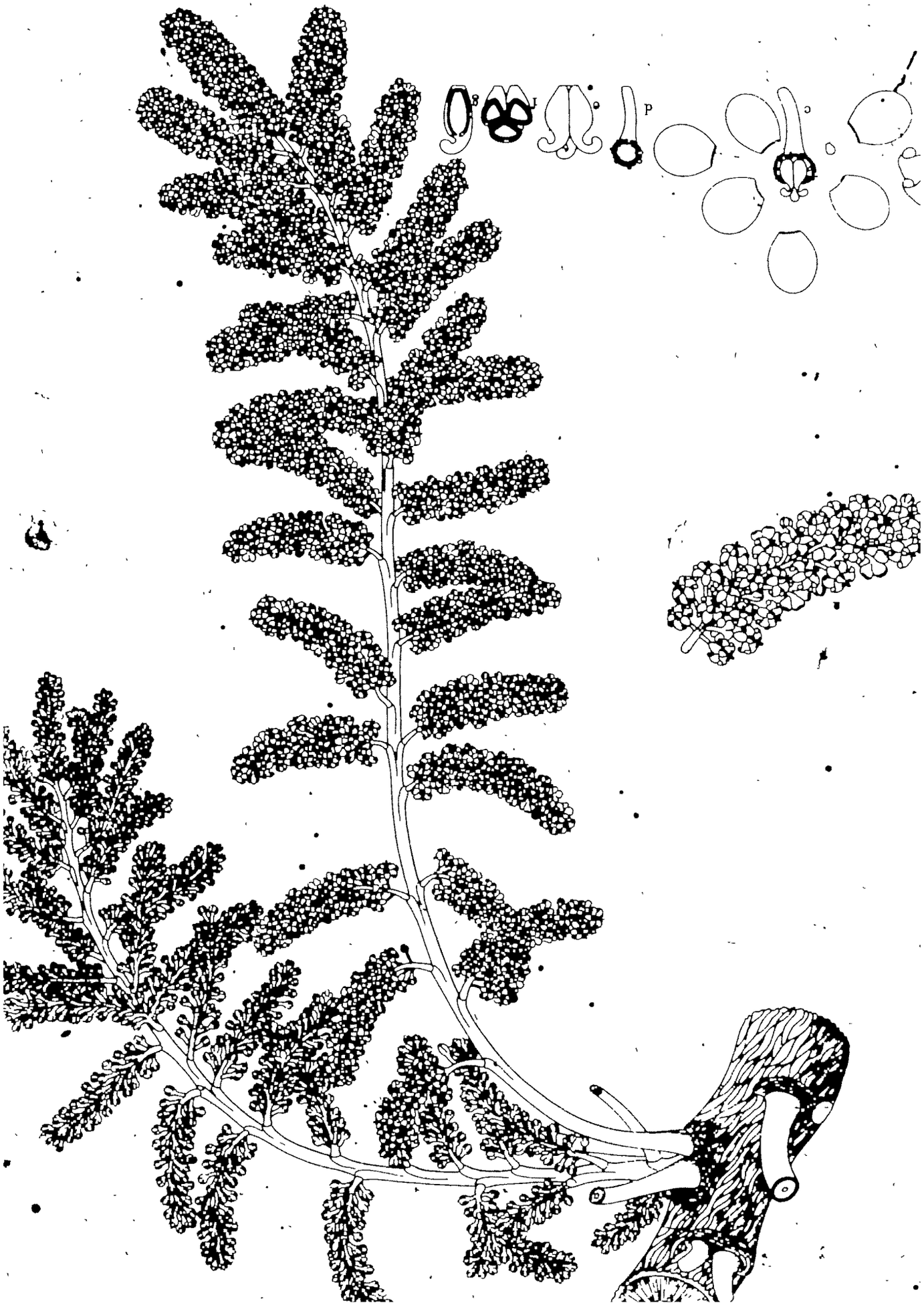
Kedba bahir pariya .... The straw is come out. Jackals have taken out the corpse; you must not go that way.

Bhavání Púter.... Descendents of Bhowani. } *Phansigars.*
——— Putúr .... Town of Bhowani Púter. }

Used interrogatively to ascertain, without the risk of exposing themselves, whether persons whom they meet on their journeys, and whom they suspect to be of the same fraternity, are so or not. When caution is particularly requisite, the question is

put in the latter and less suspicious shape. The [illegible] le *put* ascertains the point of their connexion with *Bhavání*, while from the termination *úr*, which signifies a town or village, they would appear to a stranger to be enquiring only about some particular place.

PHANSIGARS bring up all their male children to the profession, unless bodily defects prevent them from following it. The method observed in initiating a boy, is very gradual. At the age of ten or twelve years, he is first permitted to accompany a party of *Phansigárs*. One of the gang, generally a near relation, becomes his *ustád* or tutor; whom the child is taught to regard with great respect, and whom he usually serves in a menial capacity, carrying a bundle, and dressing food for him. Frequently the father acts as the preceptor to his son. In the event of being questioned by travellers whom he may meet, the boy is enjoined to give no information further, than that they are proceeding from some one place to another. He is instructed to consider his interest as opposed to that of society in general; and to deprive a human being of life, is represented as an act merely analogous and equivalent to that of killing a fowl or a sheep. At first, while a murder is committing, the boy is sent to some distance from the scene, along with one of the watchers: then allowed to see only the dead body: afterwards more and more of the secret is imparted to him—and, at length, the whole is disclosed. In the mean time, a share of the booty is usually assigned to him. He is allowed afterwards to assist in matters of minor importance, while the murder is perpetrating: but, it is not until he has attained the age of 18, 20, or 22 years, according to the bodily strength he may have acquired, and the prudence and resolution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he may have evinced that he is deemed capable of applying the *dhoulí*, nor is he allowed to do so, until he has been formally presented with one by his *ustád*. For this purpose a fortunate day being fixed upon, and the time of the *Desserah* is deemed particularly auspicious, the preceptor takes his pupil apart and presents him with a *dhoulí*, which he tells him to use in the name of JAYÁ; he observes to him that on it he is to rely for the means of subsistence, and he exhorts him to be discreet and courageous. On the conclusion of this ceremony his education is considered to be complete, he is deemed qualified to act as a *P'hánsigár*, and he applies the noose on the next occasion that offers.

After his initiation, a *P'hánsigár* continues to treat his preceptor with great respect. He occasionally makes him presents, and assists him in his old age; and, on meeting him after a long absence, he touches his feet in token of reverence.

Such is the effect of the course of education I have described, strengthened by habit, that *P'hánsigárs* become strongly attached to their detestable occupation. They rarely, if ever, abandon it. *(l)* Some, narrowly escaping the merited vengeance of the law and released from prison under security, could not refrain from resuming their old employment; and those who, bending under the weight of years and infirmities, are no longer able to bear an active or principal part, continue to aid the cause by keeping watch, procuring intelligence, or dressing the food of their younger confederates.

The bonds of social union among *P'hánsigárs* are drawn still closer by intermarriages. Though not of frequent occurrence, instances are

(l) There are known to have engaged in this vile of the Gen[illegible] as [illegible]

not wanting in which they have married into families deemed honest and respectable. The women are not ignorant of the proceedings of their husbands. Persons of mature age are very rarely admitted into the fraternity, and when this has been done, it was only after long and intimate intercourse had enabled the *P'hánsígárs* fully to appreciate the character of their confederates.

To the influence of personal character, the *P'hánsígárs* usually indebted for becoming the heads of gangs. Like others, who follow lawless and abandoned courses, the *P'hánsígárs* are profligate and improvident, and addicted to the use of *bang*; so that the wealth they may acquire, even though considerable, is soon wasted.

Whether any *P'hánsígár* were ever capitally punished by the Nabobs of the *Carnatic*, I know not. One gang, settled in the polium of *Chargál*, near the *Paidnáigdrug Pass*, between the upper and lower *Carnatic*, was apprehended about 17 years ago, and fined to the amount of 5,000 rupees by the *subáhdar* of the province; a mode of punishment so far from being justifiable, that it could hardly have been imposed except from sordid motives: nor could it fail to give new impulse to the activity of the *P'hánsígárs*, and to render them more than ever rapacious and secret in their barbarous practices.

Hyder Alli proceeded against these criminals in a very summary manner, and destroyed several of them. In the reign of Tippoo, some were sentenced to hard labour, and others suffered mutilation of the limbs. While Purniah was *Regent* of *Mysore*, during the minority of the present Rajah, highway robbery being frequent, was made capital, and several *P'hansígárs* were executed.

It must be obvious that no estimate, except what is extremely vague and unsatisfactory, can be formed of the number of persons that have

annually fallen victims to *Phánsigárs* in the south of *India*. The number has varied greatly at different periods. There is reason to believe, that from the time of the conquest of *Mysore* in 1799, to 1807 and 1808, the practice of *Phánsigárs*, in this part of *India*, had reached its acme; and that hundreds of persons were annually destroyed. (*m*) The great political changes, which marked the commencement of that period, and the introduction of a new system of government in *Mysore*, the *Ceded Districts*, and the *Carnatic*, though infinitely preferable to the former, yet was it in many respects less jealous and vigilant, and afforded facilities of communication before unknown between distant countries, of which the *Phánsigárs* and other criminals availed themselves to overspread the country: and it may be conjectured that many persons, deprived by the declension of the *Mohammedan* power of their wonted resources, were tempted to resort to criminal courses to obtain a subsistence.

The foregoing description of the *Phánsigárs* is meant to be more particularly applicable to those gangs that were settled in the northern part of the *Carnatic* and in the *Ceded Districts*, antecedently to the year 1808. Since that time, they have become well known to the *English* courts of justice, and their habits have undergone some changes. Many have left the Company's territories and fled to those of the *Nizam*, and of the *Mahrattas*. But though the number of them is greatly diminished, *Phánsigárs* still infest the dominions of the Company. The gangs,

(*m*) In one of his reports, the magistrate of *Chittoor* observes:—"I believe that some of the *Phánsigárs* have been concerned in above two hundred murders; nor will this estimate appear extravagant, if it be remembered, that murder was their profession, frequently their only means of gaining a subsistence: every man of fifty years of age, has probably been actively engaged during twenty-five years of his life in murder, and by the most moderate computation, it may be reckoned, that he has made one excursion a year, and not each time with ten victims."

Yet, Francis Bartolomeo says, in a note page 89.—"During my residence of 13 or 14 years in *India*, I never heard of any travellers being robbed or murdered on the highway."—*Travels in India, translated by* Forster.

indeed, consist of fewer persons than formerly; their plans are less systematic, their range is less ample; they roam the country more secretly; more frequently changing their names and places of abode; and adopting other precautionary measures to screen themselves from justice. Unfortunately, few of the numerous *P'hánsígárs* that have at different times been apprehended could be convicted in accordance with the evidence required by the *Mohammedan* criminal law, which, admitting not the testimony of accomplices, and rarely the sufficiency of strong circumstantial evidence unless confirmed by the confession of the culprits, their adherence to protestations of innocence has alone, but too frequently, exempted them from punishment. Those that have been tried and released becoming greater adepts in deceit, have, together with their old propensities, carried with them a knowledge of the form of trial, and of the nature of the evidence requisite to their conviction.

The habits and proceedings of the *P'hánsígárs* it is reasonable to conclude have been modified and varied by different circumstances and events of a local or political nature in the several states infested by them, in some places approximating more than in others to the foregoing description. There is every reason to believe, that in the *Deccan*, and more particularly in the territories of the *Nizam*, *P'hánsígárs* are very numerous. They will be naturally encouraged to settle in greater numbers, and to carry on their practices with less caution and secrecy, in a country, a prey to anarchy or invasion, where the administration is feeble or corrupt, or where crimes are constantly committed with impunity. It is also not unreasonable to [illegible], that they may occasionally act in concert with other classes of de[illegible]ents; and that their proceedings may sometimes be of a mixed nature, partaking of the peculiarities of those with whom they may be in league. In those countries too, where *P'hánsígári* has been long practised, it may be presumed,

halting; neither are they accustomed to murder near to their own habitations; circumstances which not only prevent suspicion attaching to them as the murderers, and to the local authority as protecting and sharing the booty with them, but tend to throw it upon others, who reside near to the spot whither a traveller may have been traced, and where he was last seen. Besides, a person setting out on a journey is often unable to fix any period for his return; and though he should not revisit his home at the expected time, his delay will, for a while, excite little alarm in the minds of his friends. He is supposed to be unexpectedly detained—to be ill—to have met with some ordinary accident—to have deserted his family—to have died. Should suspicion arise that he has been murdered, the act is attributed to ordinary highway robbers, and it is but seldom that minute enquiries can be instituted by his bereaved relatives. But supposing that this is done, and the progress of the missing traveller traced to a particular place and not beyond it, still suspicion would be apt to attach to any, rather than to a few apparently inoffensive travellers, journeying either for the purpose of traffic, as is imagined; or, as is often pretended, to see their relations—or, to be present at some marriage; and who, if ever noticed, have perhaps been long since forgotten. If, notwithstanding all those improbabilities, suspicion should fall upon the actual perpetrators, where could they be found?

Thus with respect to sepoys, who, having obtained leave of absence, never rejoined their corps, the conclusion generally formed has been, that they had deserted—when, in various instances, they had fallen sacrifices to the wiles of the *Phansigars*. The same observation is particularly applicable to *gold* peons, charged with the conveyance of money and valuables; many of whom having disappeared, no doubt was entertained that they had absconded, and appropriated the property to their own use. Even the apprehension, which an indistinct idea of

danger tends to create in the minds of these and other travellers would render them only more liable to fall into the snare. Less persuasion would be requisite to induce them to join a party of *Phansigars*, prompted by the belief that they were thus providing, in the most effectual manner, for their own safety.

What constitutes the most odious feature in the character of these murderers, is, that prodigal as they are of human life, they can rarely claim the benefit of even the palliating circumstance of strong pecuniary temptation. They are equally strangers to compassion and remorse—they are never restrained from the commission of crimes by commiseration for the unfortunate traveller—and they are exempted from the compunctious visitings of conscience, which usually follow, sooner or later, the steps of guilt. "*Phansigars*," they observe, with cold indifference blended with a degree of surprise, when questioned on this subject, "is their *business*;" which, with reference to the tenets of fatalism, they conceive themselves to have been ordained to follow. By an application of the same doctrine, they have compared themselves, not inaptly, to tigers, maintaining, that as these ferocious beasts are impelled by irresistible necessity, and fulfil the designs of nature in preying on other animals, so the appropriate victims of the *Phansigars* are men; and that the destiny of those whom they kill "was written on their foreheads."

This state of moral imbecility and debasement, yet calculated to give birth to pity, while it aggravates the horror with which we contemplate their atrocities, [illegible] not to be forgotten, that unlike many who adopt criminal courses, the *Phansigars* had not previously to divest themselves of upright principles—to [illegible] their feelings; but that, on the contrary, having been trained up from their childhood to the profession, they acquired habits unfitting them

for honest and industrious exertion; that a detestable superstition lent its sanctions to their enormities: and that they did but obey the instructions, and imitate the examples, of their fathers.

THE *Thegs*, (n) in the more northern parts of *India*, may be divided into three classes. The first consists chiefly of *Mohammedans* who originally resided under the protection of zemindars of large estates, as HURA SING, DIA RAM, &c. and in the district of *Etawah*; including also a few stragglers at other villages. The second class is composed of *Hindus*, who are for the most part of the *Lodeh* cast, and is much more numerous than the former. They resided in great numbers in the eastern part of *Etawah*, and the adjoining district of *Cawnpore*, until alarmed by the active exertions of the magistrates, by whom many were apprehended. These *Thegs* had long escaped suspicion by engaging in tillage, and by always carrying on their depredations at a distance from home. The third class is more considerable in respect to number, and extends over a larger tract of country than either of the foregoing classes. It consists of a desperate association of all casts, which grew up in the *Pergunnahs* of *Sinlouse* and *Purtara*, and the neighbouring villages on the *Mahratta* territories. They travel in large bodies, and are more bold and adventurous than the *Thegs* in the Company's provinces. Their predatory excursions are chiefly confined to the country that lies to the eastward and southward of *Gwalior*, and to the province of *Bundlecund*.

THEVENOT, in the following passage, evidently alludes to the *Phansigars* or *Thegs*.

(n) The term *Theg* is not unknown in the south of *India*, but it is not applied to the *Phansigars*, but to a class of delinquents to whom it seems more appropriate, viz. to cheats or swindlers, who, often appearing as peddlers or coral sellers, practice various fraudulent acts, particularly in substituting bad coins for goods, which they receive under the pretence of giving or taking change.

"Though the road I have been speaking of from *Delhi* to *Agra* be "tolerable, yet hath it many inconveniences. One may meet with "tygers, panthers, and lions upon it, and one had best also have a care "of robbers, and above all things not to suffer any body to come "near one upon the road. The cunningest robbers in the world are "in that country. They use a certain slip with a running noose, "which they can cast with so much slight about a man's neck, when "they are within reach of him, that they never fail, so that they "strangle him in a trice. They have another cunning trick also to "catch travellers with. They send out a handsome woman upon the "road, who with her hair dishevelled seems to be all in tears, sighing "and complaining of some misfortune which she pretends has befallen "her. Now as she takes the same way that the traveller goes, he easily "falls into conversation with her, and finding her beautiful, offers her "his assistance, which she accepts; but he hath no sooner taken her up "behind him on horseback, but she throws the snare about his neck "and strangles him, or at least stuns him, until the robbers (who lie hid) "come running into her assistance and complete what she hath begun. "But besides that, there are men in those quarters so skilful in casting "the snare, that they succeed as well at a distance as near at hand; and "if an ox or any other beast belonging to a *caravan* run away, as "sometimes it happens, they fail not to catch it by the neck." (o)

Travellers in the south of *India* also are sometimes decoyed through the allurements of women into situations, where they are murdered and plundered by persons lying in wait for them; but, whether by that class of criminals who are properly called *Phansigars*, I am uncertain. This method, as well as that of administering intoxicating and poisonous mixtures to travellers, though inconsistent with the habits of the large

(o) Thevenot's Travels, part III. page 61.

gangs, who are not accompanied in their excursions by women, may perhaps be resorted to by smaller and more needy parties, who rob near to their own abodes, or who, having no fixed habitation, continually roam with their families from place to place.

WITH respect to the practice of throwing the noose from a distance, as mentioned by THEVENOT, and which is that of the *Binjaris* in *India*, to recover their strayed bullocks, (p) I conclude it to be the same as was resorted to in battle (according to FIRDAUSI) by the ancient *Persians* and other *Asiatic* nations, for seizing and binding their enemies, and dragging them off horseback. The *cammand;* (literally a rope or noose,) said to have been formed of silk, or of the dried skin or sinews of animals, is mentioned in various parts of the SHAH NA'MAH. Thus, in narrating the exploits of the renowned champion RUSTUM, it is said:—

همی رفت رستم چو پیل دژم — کمندی ببازو درون شصت خم

RUSTUM advanced like a furious elephant,
His *cammand* in his arm full sixty coils.

(p) TAVERNIER, speaking of the *Circassians*, observes:—"Ils ne se servent point de chiens ni d'oyseaux pour la chasse, & quand ils y vont ils s'assemblent d'ordinaire sept ou huit des principaux du village. Ils ont de si bons chevaux qu'à la course ils fatiguent la beste & la forcent de se rendre. Chacun tient toute prête une corde qui a un nœud coulant & c'est attachée à l'arçon de la selle, & ils sont si adroits à la jeter au col de la beste qui se rend de lassitude qu'il y en a peu qui leur echapent."—Tom I. Liv. Troisieme, Ch. XI.

The *Lazo* of the *South American Indians*, enables them to strike and entangle animals at the distance of 300 paces. It is a strip of leather, five or six feet long, to each end of which is fastened a stone about two pounds weight. The huntsman, who is on horseback, holds one of these stones in his hand, and whirls the other round like a sling as swiftly as possible, in order to hurl it with more force, when he throws it at the animal he has singled out, which he is almost certain of striking.

The *Lazo* of the *Spanish* peasants of *South America*, in the use of which they are amazingly expert, differs from that used by the *Indians* in having a single noose, in place of a ball at each end. It is their principal weapon, for they employ it on all occasions, both in hunting and in their private quarrels. ULLOA says, that the *Spanish* peasantry can strike and halter the object of their attack, with almost unerring certainty, at the distance of 30 or 40 paces; but that a small distance, such as 10 or 15 paces, renders their dexterity in some measure ineffectual.—Vide Encyclo. Brewst. Art. Chill.

بیامد زالاد بگشاد بند بفتراک بستش آن کیانی کمند

He loosed AFLAD (q) from his bonds,
And tied his *Kyanian* (r) *cammand* to the bow of his saddle.

که از پشت زین شان بکم کمند ربودم سر و پای کردم ببند

For from their saddles, with the noose of my *cammand*,
I tore them, and bound fast their heads and feet.

بیندانخت آن تاب داده کمند بیکی سپاه از آن انجمن کرد بند

He threw the well-twisted *cammand*,
And caught many a horsemen on the same spot.

چو از دست رستم رها شد کمند سر تاجدار اندر آمد ببند

When the *cammand* issued from the hand of RUSTOM,
The crowned head (s) became imprisoned.

In the same manner as the *cammand*, the *Pasan*, (*Tel.*) or *Pasan*, (*Tam.*) literally a rope, was also, it is probable, used by the ancient *Hindu* heroes in war. If the authority of the RAMAYANA were allowed to be sufficient to establish the point, it might be asserted that there were three sorts of *Pásas* known to the *Hindus*: two, viz. the noose of justice and the noose of death, pertaining to YAMA; and one, the noose of the water, to *Varuna*. They are mentioned in the following passage among the weapons presented by VISWAMITRA to RAMA.

धर्म्मपाशंतथैवास्त्रंकालपाशमनुत्तमं
वारुणमस्त्रमप्रतिमं ददामि परमार्चितं

(q) A prisoner to RUSTOM in the plains of *Mazendran*—the *Persian* region of magic and romance.

(r) From the dynasty of ancient *Persian* Kings so named.

(s) Alluding to *Khecan* or the King of *China*, who, seated on his elephant, was taken prisoner by RUSTOM in a great battle, in which the former had come to the assistance of the *Turks* against the *Persians*.—See also D'Herbelot's Bib. Or. Art. Khathai, &c.

"I give thee the *Dherma-pásá*, and also, the missile weapon *belonging to it*; the cruelly-conquering CA'LA-PÁSA, and the highly valued VARUNA-PÁSA." *(t)*

SIVA is sometimes, though very rarely, represented with the PÁSA; *(v)*—VISHNU, as HARI, is invoked in the *Bhágavat*, and said to hold it in one of his eight hands; and GAN'E'S'A, as the lord of wiles, stratagems, &c. is almost always represented with the PÁSA.

How long the country south of the KISTNA has been infested by *Phánsigárs* I know not, though it is certain that they have been settled in the *Poliums* of *Chittoor* for at least a century. On this point the *Phánsigárs* themselves are quite ignorant, knowing in general little more than that their fathers and grand fathers followed the same horrid employment, and taught it to their children. There is however no reason to suppose that the practice in this part of *India*, is of great antiquity. It may also be a question whether to the *Hindus* or to the *Musselmans* ought to be considered as attaching the reproach of inventing this detestable system of pillage and murder. The respect paid by *Mussalman Phánsigárs* to the omens and modes of divination, and to the religious and idolatrous rites of the *Hindus*—a respect apparently not accidental, but which pervades, and seems interwoven with their whole system—affords grounds for the belief, that to them, rather than to the *Musselmans*, is to be ascribed the invention.

ON the other hand it may be argued, that had these bands of murderers consisted primarily of *Hindus*, it would probably have appeared

(t) Book I, section 26.—The learned translators of the RA'MA'YANA, state the *pásá* to have had the power of entangling or binding the foe, and suppose it to have been a kind of gin or net.

(v) A print, in which JAYO or SIVA, and QUEEREARI or GAN'E'S'A, are represented with the *pásá*, will be found in Picart's Customs and Religious Ceremonies, Vol. III. page 457.

that the practice was of considerable antiquity, in which case there could hardly have been that prevailing ignorance among the *Hindus* with regard to it which is found to exist. It is a practice more in unison with the habits and customs of the *Mussulmans* than with those of the *Hindus*. The gangs at least in the southern parts of *India*, consist chiefly of *Mussulmans*, and similar practices, it has appeared, prevailed in *Hindustan* in the time of SHAH JEHAN and AURUNG ZEB, and probably much anterior to the reigns of these monarchs, and have continued to the present day; and if, as I have been informed, *Persia* and *Persia* be infested by *Phansigars*, little room is left to doubt that these murderers came along with the *Mohammedan* conquerors into *India*, and that they have followed the progress southward of the *Mohammedan* arms. In support of this opinion it may be observed, further, that in the more southern provinces which were never, or which fell lately, a prey to *Mohammedan* conquerors, *Phansigars* do not appear even yet to have established themselves. I have not heard of any gangs being found to the south of *Salem* in *Baramahal*; and even there, there is reason to believe, but recently migrated thither from the *Poliums* of *Chittoor* and the zillah of *Cuddapah*. With respect to the *Hindu* origin, adverting to the disposition observable among the lower orders of both nations to adopt the rites and customs of each other, they may have been introduced and eagerly received among ignorant and superstitious offenders, ever prone to embrace a scheme which serves the purpose of tranquillizing the mind without requiring the abandonment of criminal habits, either by *Hindu* converts to *Islamism*, or by such *Hindu* criminals as retaining their religion, attached themselves to bands of *Phansigars*.

RICHARD CHERWOOD,
Surgeon on the Establishment of Fort St. George.

December 1816.

R. C.

As a Supplement to Mr. SHERWOOD's paper on the class of robbers and murderers in the southern parts of *India*, denominated *Phansigars*, and in confirmation of the intelligence received by him respecting a similar "class of criminals, under the appellation of *Thegs*, who infest the upper part of *Hindustan*," Mr. HARINGTON submits to the Society an extract from an official document of a recent date.

As connected with the subject, he also lays before the society an extract from the same document, respecting other descriptions of robbers and vagrants, in the western provinces.

OBSERVATIONS

REGARDING BADHEKS AND THEGS,

Extracted from an offical report by Mr. JOHN SHAKESPEAR, Acting Superintendent of Police for the Western Provinces, dated the 30th April, 1816.

THE most heinous robberies committed in these Provinces are perpetrated by gangs of *Badheks* and *Shighal Khors*. These gangs are almost exclusively settled in the District of *Aly Gher*, and in that part of the territory of the Nawab Vizier, bordering the District of *Goracpur*. After much inquiry I am disposed to believe that the *Badheks* of *Aly Gher*, and the *Shighal Khors* of *Baraich*, are connected with each other; and are one and the same people; the name constituting the sole distinction. Exclusive of the *Shighal Khors* established in the country of the Nawab Vizier, the following tribes of Jackal-eaters are notorious in the Western Provinces;—*1st, Badheks,—2d, Kunjar,—3d, Gidia, 4th, Bauria,—5th, Harbura.* All of these subsist by robbing, and are

mostly wretched vagrant life, eating the [illegible] of jackals, lizards, etc. Many of them, or conversely, reside with their families in temporary huts, constructed of reeds and leaves, and erected in jungles and plains. The term *Badhek* is said to be derived from the *Sanscrit* word, "*Badh*," "destruction."—The following distich is taken from a *Hindee* Author.

"Kuanbhi [illegible] bhot hyn, Tulsi dúr dis [illegible],
"Badhee, Badhek mirg bán to rudhir det bulae."

Which may be rendered—

O Tulsi, friends become enemies in the days of misfortune; even as the blood of the stricken deer serves as a guide to the Huntsman (destroyer).

The *Badheks* of *Joly Gher* and the *Shigal Khors* of *Lowaghir* are considered of *Mussulman* as well as *Hindu* tribes; the majority however are *Rajputs*. The records of the office shew a subdivision of clans amongst the *Badheks*, as the *Sidanki*, *Dúdhathal*, *Jaran*, *Dooti*, *Ehipti*, *Badharah*, *Powar* and *Chowan*, the two last of which are also the distinguishing names of [illegible] tribes.

The *Badheks* are divided into separate gangs, each consisting of from thirty to an hundred followers, headed by a jummadar; and these gangs occasionally unite for the purpose of carrying on their depredations with greater certainty of success and despatch. They are commonly protected by zemindars, who support their families during their absence, and assist them when they are apprehended and get into trouble; becoming security to the Police for their future good behaviour, and employing them ostensibly as ryots; but in fact harbouring and encouraging them in their predatory habits, for the sake of the proceeds

tion of plunder, which they invariably receive. They are also frequently supported by petty Mahajuns, who advance them money at an exorbitant interest.

Some of the *Badheks* share such booty as they obtain; others receive a monthly stipend of two or three rupees, from their jummadars, who also feed and maintain them at a considerable expense, supplying them with spirituous liquors, of which they drink inordinately. The jummadars have generally considerable sums of money at their command, either for immediate expenditure, or for obtaining their release by bribery, when apprehended.

Formerly numbers of *Badheks* infested different parts of the Districts of *Alygher*, *Etawah*, *Furruckabad* and *Agra*. At present those residing in the Company's Western Provinces are settled on the estates of the Chieftains of *Moorsan*, *Hatras*, &c. in *Alygher*, and some few in the district of *Agra*. The rest are established in great numbers in pergunnahs *Atrouli*, *Balrampur* and *Baraich*, in the North East quarter of the territory of the Nawab Vizier, and also in the vicinity of *Gohad*, *Gwalior*, *Bhertpur*, and the country to the westward of *Dehli*.—The gangs generally make excursions once a year, in the prosecution of which they journey several hundred miles.—Those in *Alygher* have been known to range to *Saharanpur*, *Haridwar*, *Lucnow*, *Allahabad*, *Benares* and *Jaypur*; and those in *Baraich* to *Chaprah* in the district of *Saran*, to *Hazari Bagh* in *Ramgher*, and to *Allahabad*. On some occasions they travel separately, and meet at a given spot, or they follow one another in detached parties, in which case, they fasten shreds of cloth to trees, or pile up mounds of earth or dung, as marks to guide those of their brethren who follow their footsteps.—They travel, not unfrequently, disguised as fakeers or Pilgrims, with the water of the *Ganges*, carrying in their *kawers*, or caskets, heads of spears to arm them-

selves, and fed for their subsistence. At other times their *jamádárs* journey through the country as merchants; accompanied by their gangs, and women as servants: with camels, carts, tents and doolies. Previously to their commencing these expeditions, they send out their spies, disguised as religious mendicants, commonly as *byrágis*, to obtain intelligence in any town or city where they may determine to proceed. It is the business of these spies to gain correct information regarding the hoards of cash or jewels in the houses of merchants and others, or respecting dispatches of treasure. In the principal cities are to be found persons styling themselves *jamádárs*, who supply the bankers and merchants with hired peons, for the safeguard of treasure or merchandize. Some individuals of this description have been observed to rise to great opulence in a short time. In several confessions of *Badheks* apprehended in *Ferruckabad*, *Sárun* and other places, it is stated that the *Badhek* spies collude with those jummadars; and instances are mentioned of the *Badheks* having themselves been hired out by these *jamádárs*; to serve as peons for the protection of the treasure which they intended to plunder. The *sarráfs* and *mahájans*, whether from false economy or from carelessness, usually send their money under very insufficient escorts; and it is a common practice to attempt to remit and conceal a dispatch by sewing up the money in the cloches of the peons—When the spies have obtained information, they prepare bambus, as shafts for spears, which they bury under ground with torches for the use of the gang—They endeavor also to arrange for the reception of the gang, on their arrival, with some zemindar or local resident, with whom they may have been formerly acquainted; or they select some retired jungle or ravine where they may remain concealed till the time of action.—On the arrival of the gang the *jamádár* arranges his plan with the spies.—They then quit their place of concealment, dig up the bamboos and torches, and fixing on their spear

heads, proceed, as early in the dusk of the evening as possible, that they may have the night before them for retreat.—If a house is to be robbed, they station men to guard all the approaches, whilst they effect the robbery; and they invariably murder or wound all who come in their way.—They are equally sanguinary with the guards escorting treasure; and frequent instances have occurred of sepoys having been surprized and butchered at night.—In the dooles they carry off their wounded, as women, with the purdahs down; and as in some of these robberies, *hajáms* or village barber surgeons have been apprehended with the gangs, it is probable that these persons accompany to dress their wounds—Immediately the robbery is effected, they travel the whole of the night, in the direction of their homes, with great rapidity; and divide their booty on the following day, at the first favorable spot; when they separate and return to their places of abode by different routes.

The class of *Shighál Khers*, called *Kunjárs*, are said to have formerly been very notorious as dacoits.—There are however, very few of this class remaining in the western provinces, and those, for the most part, earn a livelihood by the manufacture of cord, baskets and by cutting wood, &c. &c. The *Bawría* and *Harbúra* classes of *Shighál Khers* are particularly squalid, and scarcely human in their appearance. The greater part of them have for time to time, been expelled from the Company's territories, but there are still many remaining; and numbers frequently make temporary incursions from the Mahratta States. These are the men who follow camps, and are particularly expert in cutting into, and stealing from tents. They are not so notorious as gang robbers, as famed for their skill as thieves and cut-purses; robbing in crowds of people, and passing the stolen property from one to another, and practising other similar tricks to prevent detection.

The *Badhaks* are similar in their habits to the two classes last mentioned, and are likewise famous for imitating the noise of animals, when they approach to rob, and for disguising themselves in skins to avoid detection.

Of these classes, the *Badhaks* are by far the most numerous and destructive to the peace of the country; and the circumstances under which they rob, combined with the precautions which they take, by giving two or three names to each individual, and using a cant peculiar to themselves, render it extremely difficult to bring them to justice.

Much scepticism still prevails regarding the existence of any distinct class of people who are designated *T'hegs*. Persons have been apprehended, tried and convicted, for highway robbery and murder, under circumstances similar to those which distinguish the crimes of this description ascribed to the *T'hegs*; but no instance has come to my knowledge of any individual having been convicted of highway robbery and murder, against whom it has been established that he was a professed *T'heg*, who earned a subsistence by the commission of this crime. The result of such enquiries as I have made upon this subject, leaves, however, little room for doubt, that there are at present persons residing in the Company's territories who practice this species of robbery as a profession; various confessions in this office shew, that regular societies of these men have had existence, communicating together and making, at stated periods, a division of their spoil.

The term "*T'heg*" is usually applied, in the western provinces, to persons who rob and murder travellers on the highways, either by poison, or the application of the cord or knife.—The literal meaning however, in its common acceptation, as given in the familiar proverb, is "villain," "rascal," "knave," &c. which also is the signification appli-

ed to the term in GILCHRIST's Dictionary.—" *Bhágalpur ca Bhágalia, Cahálgeng ca T'heg, Patna ca Dewália, tinon nám zad:*" or, "the *Bhaugulpur* Cheats, the *Cahalgeng* Knaves, and the *Patna* Swindlers, are notorious." They are known also by different appellations in other parts of *India*, as would appear from the following extract from a work recently published.

FORBES'S ORIENTAL MEMOIRS.

"SARENGPUR is famous for a a manufactory of muslins for turbans and other cottons, which are cheaper than any we have met with. A *jat'hera* or religious fair, is occasionally kept here, at which our fellow traveller, SIAD MAHOMMED, a particular friend of SIR CHARLES MALLET's, was present on his last journey to *Delhi*; when several men were taken up for a most cruel method of robbery and murder, practised on travellers by a tribe called *P'hánsigárs* or stranglers, who join passengers frequenting the fair in bye-roads, or at other seasons, convenient for their purpose. Under the pretence of travelling the same way, they enter into conversation with the strangers, share their sweetmeats, and pay them other little attentions, until an opportunity offers of suddenly throwing a rope round their necks, with a slip knot, by which they dexterously contrive to strangle them on the spot."

IN the part of *India* to which the present report relates, there would appear to be five distinct classes of robbers of this description, who rob and murder on the highways.

1st Class.—THE high roads leading through *Etawah*, *Aly Gher*, and *Furrackabad* are, for the most part, the scenes of the atrocities committed by this class. To so great an extent did this crime prevail in former year, that during 1808 and 1809, not less than 67 bodies were taken

out of wells in the single district of *Etawah*. The gangs composing this class were established and fostered in the estates of the Chiefs Tikit Sinh, Bhagwant Sinh, and Thakur Dayal Sinh in Gwalior, and of Hindupat Sinh, the former Raja of *Eta* in the district of *Etawah*, and some detached parties also resided in different parts of the three districts above named. In 1811, a list of 68 persons and several leaders called *jamâdârs*, composing these gangs, was given into this office by persons who were induced to deliver themselves up to Colonel Sleeman, under the hope of pardon. They were all *Mussulmans* and chiefly of the *Mewâtti* tribe. By the confessions made by the members of these gangs, they appear to have carried on their malpractices in small parties, assuming various disguises, resorting to the *Serais*, and accompanying travellers under specious pretences, to have watched their opportunity, and to have destroyed their victims in retired places commonly by strangulation, the knife being used also, to secure complete destruction, and the bodies being usually thrown into wells or nullahs. Deleterious drugs are said to be used only by novices in the business, the more experienced *Thegs* trusting rather to the certain effects of the knife or cord, than to the doubtful operation of poisons. These murders are most frequent in the hot winds, at which season travellers are induced to start on their journey before day light to avoid the heat.

2d *Class*.—This class consists exclusively of *Hindus*, and chiefly of the *Lodeh* tribe.—They are stated to pass themselves on travellers as *brahmins* and *cayets*, and are reported to be much more numerous than the 1st class.—The scene of their depredations has been, for the most part, on the confines of *Etawah*, and in Western thannahs of the *Ganpur* district, and they are stated to be ostensibly engaged in cultivating small spots of land, though in fact supported by the more lu-

crative profession of *Theggy*. The murders committed by these people are effected by means similar to those practised by the 1st class.

2d Class.—This class was formerly settled in the pergunnahs of *Sindouse* and *Berhare*, from whence they were expelled, and have since taken up their residence in *Mahratta* villages, on the confines of our territory, where the *aumils* of the native Governments are said to derive a revenue from their depredations. From the examinations, it would appear, that these *Thegs* are *Musselmans* and *Hindus* of various tribes. The murders committed by these gangs appear to be perpetrated more openly than those committed by the first two classes; whole parties of travellers being destroyed together, and the bodies of these victims being frequently found unburied on the plains. The depradations of this class are said to have formerly extended over different parts of the *Doab*, but latterly, to have been directed to the country near *Gwalior* and to the district of *Bundelcand*. It does not appear that the crime of murder by *Thegs* was known in the district of *Bundelcand* prior to 1812, but, in consequence of the dispersion of the *Sindouse Thegs*, no less than 19 instances of the offence were ascertained in 1813, in which 35 bodies were found with marks of the knife or cord. Very considerable gangs of these people are said to be at present collected in the *Mahratta* states. Mr. Wauchope, on the 21st instant, writes—"But a few weeks have elapsed since a party of 42 "travellers (men, women and children,) were every one strangled by a "large body of *Thegs*. The travellers were coming from *Jebbelpur* "towards *Purma*, and the murders took place about the frontier be-"tween the *Nagpur* and *Purma* country. Four of the miscreants were "seized by an officer of the *Purma* Chief, &c. &c."

It would appear from examinations in this office, that the punishment for this offence in some of the *Mahratta* states, is by enclosing

the criminal alive in a pillar constructed of masonry. The joint magistrate of *Etawah* writes, that a gang of *Thegs*, seized not long since by the Chieftain Mán Khan, were subjected to amputation of each hand, and to the loss of their noses.

4th *Class.*—Several instances of murder on the highways in the districts of *Allahabad*, *Ghazipur*, and *Juanpur*, will be observed in the detailed reports for the last year, said to have been perpetrated by persons assuming the garb of *bairagis*, who join travellers at *ghâts* and accompany them on the road, take an opportunity of mixing the seeds of the *Datura* or other narcotic plant, with the food or food of the traveller, and plunder him when stupified or killed by the effects of the dose. These murders are not, I apprehend, committed by the persons termed *Thegs*—as poisoning would appear to be the only means of destruction used by these robbers. At the same time, as they have prevailed for some years, particularly in the district of *Juanpur*, and the circumstances attending each case are nearly alike, there seems reason to believe, that some association, similar to that of the *Thegs* of the *Doab*, is established in *Juanpur* and its vicinity. Pilgrims proceeding from the west and north west to *Gáya*, or to *Jagannath* in *Cuttack*, take *Benares* in their way, and pass through the district of *Juanpur*. In like manner pilgrims proceeding from the lower provinces, pass through *Juanpur*, in their way to *Haridwar*, or to *Mathura* and *Bindraban*. The circumstances of various roads meeting in this district, combined with the facilities afforded for escape by the proximity of the country of the Nawab Vizier, are probably the causes why this offence is more prevalent in *Juanpur* than elsewhere.

5th *Class.*—Travellers have been frequently found murdered in that part of the country placed under the joint magistrate stationed at *Ghazipur*. The bodies have commonly been discovered buried, and

the same offence can be traced to the eastward, through the districts of [illegible] and *Tirhut*. In the detailed report on the state of the police, during the last year, in the jurisdiction of the joint magistrate of *Ghazipur*, a case will be found stated, in which it appeared, from the magistrate's enquiries, that a fraternity of *gosains* had long been established in that quarter, who were said to entice travellers to sojourn at their *math*, particularly sepoys, and to murder them. It is not stated what means of destruction are used by those people; but in the examinations taken before Mr. Gracroft, the zemindars would appear to be concerned with the *gosains* in these nefarious practices; and it is stated by a witness, that numbers of travellers have, for years, been made away with, in this quarter. The establishment of chokies, on the highways principally infested by these miscreants, and the employment of the village watch in aid of these chokies, are, in every respect, the most certain and efficient arrangements which can be devised for the suppression of this crime.

MEMOIR

RELATIVE TO A SURVEY OF KEMAO[illegible]

With some Account of the Principles, upon which it has been conducted.

By Captain WEBB,

Commissioned by the Most Noble the President.

THE progress made in the survey of Kemaon induces me to submit an abstract of the results before His Excellency the Commander in Chief, prefaced by a short memoir, not merely to exhibit, what has been done, but with a view to obtain instructions, as to the degree of minuteness, with which it may be deemed expedient, that the survey in question should be made up.

The number of places, whose latitudes, longitudes, and elevations, are included in the annexed catalogue, is considerably greater, than that of places on, and near the *Ganges* river, by Mr. R. Burrow," which latter forms the basis, on which the whole map of this side of *India* has been made to rest.

If it is not required, that the map of Kemaon should be more detailed, than most of other districts under this Presidency, it may be sufficient to fill up the work by routes and information: the present list of elevations may alone, be sufficient to convey a general idea of the physical aspect of the country.

But as great attention has been attracted to surveys of this nature, M. HUMBOLDT's account of *New Spain* has been published, and from other considerations, it is probable, that the work will be thought incomplete, if not accompanied by vertical sections. Hitherto the want of barometers, none having yet reached me in serviceable condition, has [illegible] my attempting a continued section, which could scarcely be effected by geometrical methods only, as no continued lines of stations could be selected, the distances of which can be determined with sufficient accuracy for this purpose.

It might also be desirable, that some approach to a physical map should be had, with a view to facilitate geological and mineralogical researches, which may by possibility, lead to important consequences. It cannot be doubted, that the mountain districts contain the precious metals, from the well known fact, that the lands of almost every mountain stream are assiduously washed for gold at the points, where their rapidity diminishes. The tribe of people, who follow this avocation, are denominated *Boksa*, and their employment is by general report attended with ample profit. The gold dust supplied by the rivers of *Africa*, has long made an opinion current in *Europe*, that some lofty central land exists, which may rival *South America* in its mines of the precious metals— and the same speculation seems no less applicable to the mountains of central *Asia*.

I have it also in view to point out a service of great practical utility, which may be derived to geography from a knowledge of the true position and elevation, of several snowy peaks in the *Himaláya* chain, of which my survey already includes upwards of *three*, and most of them are visible from the plains.

With scarcely an exception, surveys in *Bengal* have been made by the compass and perambulator only, and those who have had much

experience in measurements of this description, are well aware that five miles in an hundred is not an impossible error.

The known positions of snowy peaks afford a ready mode for determining the true geographical place of any station, from which they are visible, and may therefore be applied to the construction of maps compiled from route surveys of the description just named. It may be well to detail the several cases, in which they may be so applied, and I have appended to this memoir examples of most of them, from which a tolerably correct idea may be formed, of the degree of accuracy which may be expected to attend the results.

CASE 1st.

Three snowy peaks, the geographical positions of which are known, being visible from any place or station—and the horizontal angles they subtend at that station being observed—the distance of the station from each peak, together with its latitude and longitude, become known also.

CASE 2d.

The latitude of a station being observed, and also the true azimuth of a single known peak—the distance between the peak and the station, and the longitude of the latter, become known also.

CASE 3d.

The angle of elevation of any peak, the heights and position of which are known, being observed, and the heighth of the station being also known—these data are competent to give the distance between the peak and the station, and if the azimuth of the peak be observed, the latitude and longitude of the place of observation become known also. This case comprises the method adopted by M. Humboldt in his "Geographical Essay," under the denomination of "Vertical Bases," and which he appears to have adopted very extensively. The survey of a mountain province may thus be accomplished by aid of ba-

trigonometrical observations only, and with extreme accuracy, if the stations be very remote from each other, and are so chosen, that their relative difference of elevation shall be considerable.

CASE 4TH.

The distance and height of a known peak, together with its observed angle of elevation, give the absolute height of the station of observation—or, these being known, the prevailing degree of refraction may be obtained: which latter it may sometimes be important to know; far to the westward for instance, where the surface of the country undulates considerably, or within the mountains.

CASE 5TH.

As, by some of the foregoing, the true distance, and relative position of two or more stations on the plains of *India*, may be correctly found, it follows, that the true positions of snowy peaks, not at present known, as well as their altitude, may be found, and that such peaks will again enable an observer to determine the position of any number of stations on the plain, or within the mountains, from whence they may be visible.

It appears, therefore, that the positions of snowy peaks, already obtained by my survey, are amply sufficient to correct the geography of a vast belt of country; the breadth of which, in a southerly direction from the *Himálaya* range, averages from one hundred to one hundred and thirty miles, and in length somewhat exceeds that of the range itself.

The general direction of the snowy chain is from W. N. W. to E. S. E. nearly, to which of course the belt is parallel, and if from such a line even perambulator routes were surveyed in a southerly direction, so as to make but small angles with the meridian, the error in mea-

surement would not sensibly vitiate the longitude of the place come to, which is the element most difficult to obtain. That error would affect the latitude almost exclusively, and every tyro in practical astronomy can correct the latitude by celestial observation to within a few seconds of the truth; and thus it appears, that the limits of topographical correction, for which a means is offered by a knowledge of the positions of peaks in the *Himálaya* chain, may be made to extend far beyond the points, at which the peaks themselves cease to be visible.

Principles upon which the Survey of Kemaon has been conducted.

The base is a line, nearly in the direction of the meridian. The latitude of the station, at either extremity, having been carefully observed with a circular instrument, and the angle of an azimuth made by one of them with a meridian passing through the other, astronomically determined, the length of the base was calculated with those data. The value of the meridional degree is assumed to be 60,600 fathoms.

From the base so obtained, triangles were extended in the usual manner, the three angles being observed in all practicable cases. The sides of these were next computed in order, by plane trigonometry, the instrument made use of being divided only to 20 of a degree.

The bases of the several stations were now calculated, the angle of azimuth being in all cases either referred to the orginal base, or astronomically computed. In every instance of trial, the latitude computed from the survey agreed with celestial observation, so nearly, as to leave it doubtful which might be in error.

But it was desirable to have a station of verification, if I may so term it, as far south as possible, and I selected *Pilibhit* for this purpose. The geographical position of the great mosque at that place had been given by Mr. Burrow in this catalogue, and I purposed adopting it, as the first meridian of my survey; by which means, my map would be immediately connected with that of *Rohilkhand*, and I reserved the verifying of the absolute longitude of *Pilibhit*, till leisure and opportunity should permit me to make a series of observations, correspondent with others at the *Madras* Observatory for that purpose.

The snowy peaks, Nos. XIII, XIX, and XXV, are distinctly visible from a grove, near the town, which became my station, and I was enabled to connect it with a minaret of the great mosque by a single triangle, one side of which was measured. The true azimuth of the minaret, and the distance so obtained, gave its difference of latitude from my station 0° 51′.4 southerly. Also the latitudes of the snowy peaks, as fixed by my survey, were respectively,

XIII =	30°	15′	36″	N.
XIX =	30	15	14,1	N.
XXV =	30	52	45,7	N.

The horizontal angles, subtended by the abovementioned peaks, were observed, and their several azimuths astronomically computed.

Assuming the position of the snowy peaks to have been truly given by my survey, I computed, (as in Case 1st,) their respective distances from my station, which came out by the calculation as under,

XIII = 97591 fathoms. XIX = 98310 fathoms. XXV = 96030 fathoms.

These distances, computed with the true angles of azimuth, gave their differences of latitude, and consequently the latitude of my station and that of the mosque as follows:

Latitude of snowy peaks	XIII = 30 15 36,1	XIX = 30 32 15,1	XIV = 31 39 45,7	
Differences of latitude	1 26 19,8	1 22 58,2	1 3 18,8	
Latitude of station	28 30 16,3	28 10 16,9	28 30 17,5	
Mosque north	0 0 51,6	0 0 51,6	0 0 51,6	
Latitude of mosque	28 28 24,9	28 30 26,5	28 38 26,1	

The latitude of the mosque, by Mr. Burnett's observation, is 28° 38′ 20″ N.

This very exact result may be admitted, as a proof of the correctness of the base, the smallest error in which would have been sensibly felt, when its operation was extended to distances approaching to ten times its own length, or nearly one hundred thousand fathoms.

I next computed the differences of longitude of all the stations from *Pilibhit*, using, what is generally termed, a table of meridional parts for that purpose. It was not till a month ago, that I was much gratified by finding, that Mr. Humboldt had adopted the same method in his survey of *Mexico*, and that he had even used the same table, that given by Mendoza de Rios.

Being now assured, that the distances given by my survey were trustworthy, it became necessary to determine the heights of the several stations above *Rohilkhand*, and approximately above the sea; but the weather became hazy at *Pilibhit*, and it was not till my arrival at *Cashipur*, that a favorable opportunity for this purpose presented itself.

The snowy peaks, Nos. XI, XII, XIII, XIV, are distinctly visible from *Cashipur*, and their respective heights above that place, and also above *Cap Mark*, a high mountain near *Almora*, were calculated from their observed angles of elevation at each. The refraction being allowed at $\frac{1}{6}$ of the intercepted arch, though it is not probable, that exactly the same state prevailed at the mountain stations, and that on the plain, gave results as under:

		XI.	XII.	XIII	XIV.
Above Cásipur	Feet	26019,6	22794,4	21681,0	24904,0
Above Cáli Math	Ditto	14369,2	16811,0	15906,8	18961,2
Cáli Math above Cásipur	Ditto	5750,4	5876,0	5768,0	5852,0

The second, third, and fourth give the heights of Cáli Math above Cásipur ..... 5787 feet
Assumed height of Cásipur above the sea .... 650 Ditto

Approximate height of Cáli Math above the sea 6437

The preceding differences, should, of course, be exactly equal to each other, but the uncertainty with respect to the refraction line, together with the possible errors of observation, at both stations, are more than sufficient to account for the existing discrepancy. The mean of the whole is taken as the heighth of *Cáli Math* above the plains of *Rohilkhand*, and *Cásipur* is estimated to be 650 feet, above the sea, which cannot be very wide of the truth.

As the heighths of places within the hills, have been referred to this Altitude of *Cáli Math*, either directly, or with intermediate stations; also $\frac{1}{8}$ of the intercepted arch, has been uniformly allowed for the effect of refraction, in computing the altitude of snowy peaks and $\frac{1}{8}$ of the same arch, for all points below the inferior limit of congelation.

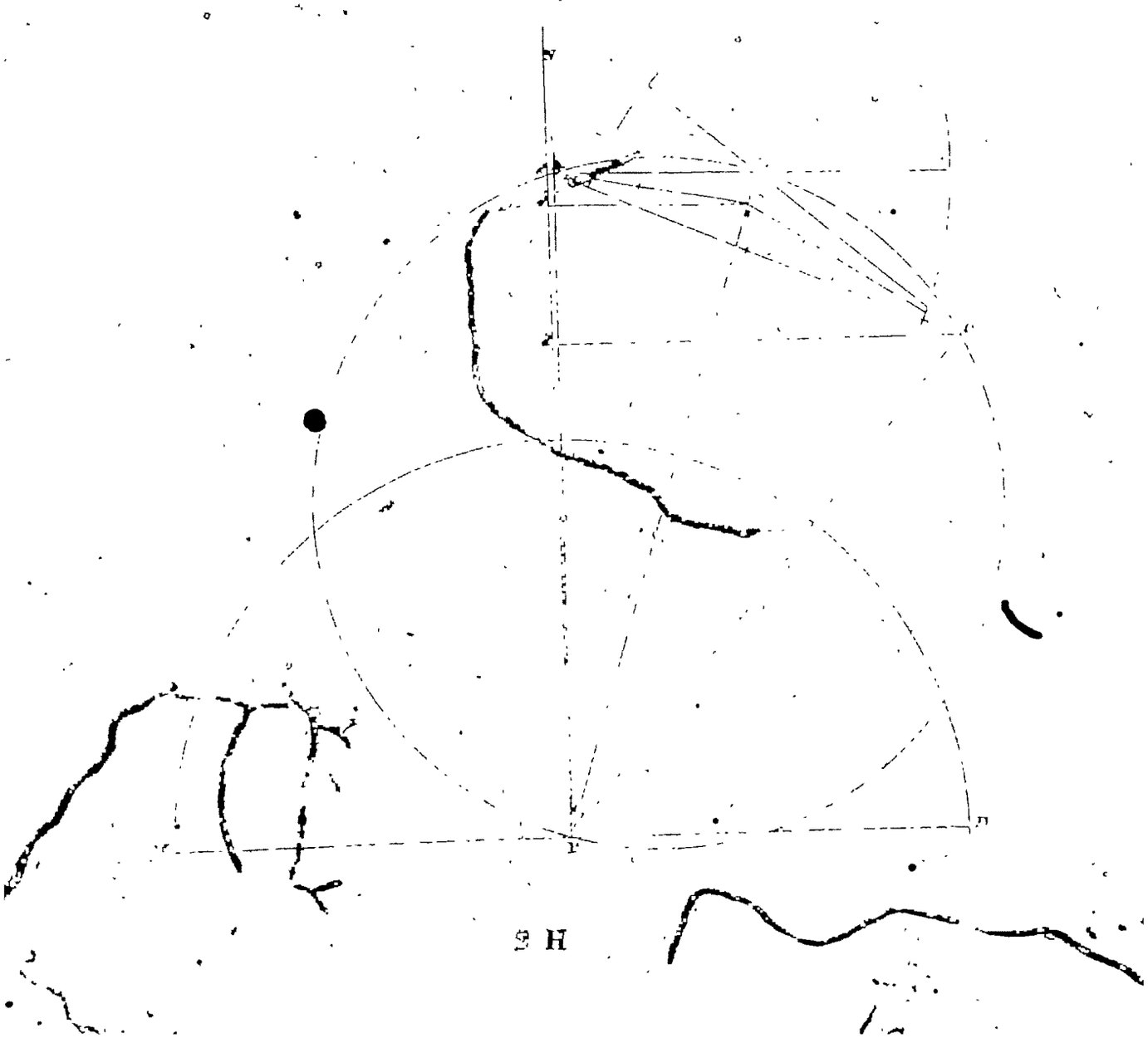
It is at present my opinion, that both these quantities exceed the medium effect of refraction; under the circumstances, in which the observations are made, and though it is not necessary to exaggerate heighths, already enormous, I am inclined to believe, that all the elevations err a little in defect in consequence of having taken [illegible]

It remains to shew examples of the cases I have suggested, in which the known positions of snowy peaks may be usefully applied to the construction of geographical maps, constructed from perambulator measurements.

CASE 1st.

The computations at *Pilibhit*, an abstract of which I have already given, furnish an example of this kind; and it has been shown, that the latitudes of the place of observation as obtained severally, from three very distant snowy peaks, do not differ from each other more than a single second. It may therefore be presumed, that the distances are equally correct, or that the error upon any one of them does not exceed twenty fathoms.

On account of its great simplicity, I subjoin a graphical solution of the problem in that particular instance.



In the preceding diagram the ſtation near *Pilibhit* is repreſented by P. *A*, *B*, *C*, are the ſnowy peaks, Nos. XIII, XIX, XXV, reſpectively; *PA*, *PB*, *PC*, their diſtances from the ſtation; *Pd*, *Pd'*, *Pd''* their differences of latitude. *PN* is a meridian paſſing through the ſtation. The things known are marked with a line (′), the things required with a cypher (o).

CASE 2D.

Is that moſt likely to occur in practice, as it affords a means of computing the longitude of the ſtation from obſervations of a ſingle known peak.

It ſuppoſes to be known, the co-latitude of the peak, the co-latitude of the ſtation, and the angle of poſition at the latter; to find the arch of diſtance, and the angle made by their meridians at the pole, or which is the ſame thing, their difference of longitude.

The following are inſtances, in which I have computed the longitude of places in *Rohilcund* by this method.

The firſt ſtation is a walled garden a little to the eaſtward of the town of *Cásipur*, four ſnowy peaks were viſible and gave the longitude as below:

			° ′ ″
Longitude of Cásipur by No. XII	=		78 48 54,8 E.
XIII	=		78 48 52,3
XIV	=		78 48 55,5
XI	=		78 48 53,8
Mean Longitude			78 48 54,1

The longitude of *Cásipur* according to Mr. Burrow is 78° 51′ being 2′ 6″ more eaſterly. But the longitudes given by Mr. Burrow are deduced from aſtronimical obſervation entirely, and he himſelf ſuggeſts that ſome of them may be as much as five minutes in error.

The next station is the village *Chemrowa*, in the *Ramgur* district.

Longitude of Chemrowa, deduced from No. XII,	=	78	38	13,2
No. XV,	=	78	38	8,8
Mean longitude,		78	38	10,8

The third and last example was obtained at the fort of *Afzelgerh*.

Longitude of Afzelgerh by No. VI,	=	78	31	55,8
VIII,	=	78	32	17,7
XII,	=	78	32	2,7
XIII,	=	78	32	5,4
XV,	=	78	32	35,8
Mean longitude,		78	32	9,0

The snowy peaks, Nos. VI and VIII, are comprised in the cluster supposed to be *Badrinath*, and by a reference to the conditions of the triangle, which assigns their position, they will be found so unfavorable as not to promise a result of *great exactness*.

It will also be observed, that the angles made by the azimuths of the eastern peaks with the meridian are very considerable, and that the smallest error in the assumed latitude or azimuth, will produce a very sensible effect, under these circumstances.

The longitude of *Afzelgerh* by Mr. Burrow is 78° 33′ 40″, or easterly of mine 1′ 33″.

The difference of longitude between *Pilibhit* and *Chispur*, is by Mr. Burrow 5′ 6″ less than by my survey. And the difference of longitude between *Chispur* and *Afzelgerh* is 5′ 33″ greater, than by me, although his station at the former place, was to the *westward* of mine.

And it is evident, that though the errors of astronomical observations may be plus or minus, *indiscriminately*, such cannot be the case with

trigonometrical deductions from fixed points. I have used the same peak No. XII and XIII both at *Cassipur* and *Afzelgerh*.

CASES 3 and 4.

I have already noticed that to attain *great* accuracy by the first methods, the difference of height of the stations should be considerable, and the distance not very great; especially when the angle of elevation or depression, can be observed at one station only. Not being provided with barometers, I have no such example to offer, as I could wish, or as the methods themselves are fully sufficient to afford.

When the arch of distance is very great, and the angle of elevation extremely small, the varieties to which the refractive state of the atmosphere is subject, will alone occasion discrepancies of vast amount. That this is the case, will be clearly seen by the following approximations, in which I have supposed the stations to be precisely on the same level with *Cassipur*, which is not of course, strictly true.

STATION AFZELGERH, EXAMPLE I.

Refraction.	°	′ ″	″	″
Distance No. XII. by case 3d.....	77820	80956	74424	[illegible]
True Distance of No. XII.	78843	78[illegible]3	78613	[illegible]
Error.....	−1045	[illegible]	+631	+176

Refraction	°	′	″	″
Distance No. XIII. by case 3d ..	79779	89516	81403	80936
True Distance No. XIII	80896	80[illegible]3	80[illegible]6	80896
Error.....	−1117	+[illegible]3	+[illegible]	+51

Refraction.	°	′	″	″
Distance No. XV. by case 3d.....	87107	90658	89871	88812
True Distance No. XV.....	89018	89018	89018	89018
Error.....	−1911	+1640	+853	−206

STATION CHAMROWA, EXAMPLE II.

Refraction	·	$\frac{1}{11}$	$\frac{1}{11}$	$\frac{1}{11}$	$\frac{1}{11}$	$\frac{1}{11}$
Distance No. XII. by Case 3d.	94079	97397	97979	98152	98485	98811
True Distance of No. XII.	98578	98578	98578	98578	98578	98578
Errors.....	−3899	−1181	−599	+426	−93	+233

THE true distances of the snowy peaks, which have been used as a standard of comparison in the preceding examples, were derived by Case 2d.

IT seems reasonable to infer, that the refractive state of the atmosphere demanded an allowance, in the first example, equal to about $\frac{1}{11}$ of the intercepted arch, and in the second to $\frac{1}{11}$ nearly.

HAD the mean state of refraction, which I assume to be $\frac{1}{11}$ for snowy peaks, been used in these instances by a traveller, desirous to know his place in the map, his conclusion would have been erroneous by about $\frac{1}{2}$ a mile, at *Afzelgerh*, and by something less than $1\frac{1}{2}$ mile at *Chamrowa*. He might still, however, console himself with reflecting, that, even were it possible to find a level road to the *Himálya*, a perambulator surveyor could not measure the distance, after many day's labor, with any chance of obtaining it so correctly, as it had been thus acquired by an observation, which was made and computed in twenty minutes.

I CANNOT at present offer an example of the 5th Case, as no snowy peak is visible from any part of *Rohilcund*, where I have been, the position of which is not already established by my survey of *Kamaon*,

Catalogue of Places, with their respective Latitudes, Longitudes, and Elevation above the Sea, as derived from a survey of Kemaon.

By Captain W. S. Webb, Surveyor.

No.	Names of Places.	Latitudes.	Longitudes.	Elevations.
		° ′ ″	° ′ ″	Feet.
1	Pillbhit. (the Great Mosque)	28 39 20 N.	79 41 45 E	——
	Station (A) (In Grove near ditto.)	28 39 16.9	79 42 19.8	——
	Câli Math, (Gorkha Stockade.)	29 38 11.5	79 30 19.6	6417
	Snowy Peak I. (Great Himálaya.)	30 49 47.2	78 51 10.6	22345
5	.... II.	30 49 4.3	79 52 11.3	22053
	.... III.	30 46 22.3	78 55 16.9	22840
	.... IV.	30 45 46.0	78 58 46.1	21511
	.... V.	30 38 28.9	79 4 49.5	19106
	.... VI.	30 32 22.0	79 6 10.9	22408
10	.... VII.	30 41 57.7	79 7 28.0	21575
	.... VIII.	30 43 40.9	79 8 17	23164
	.... IX.	30 44 4.3	79 15 16.2	21511
	.... X.	30 20 16.9	79 28 0.7	15733
	.... XI.	30 20 6.1	79 38 40.8	20686
15	.... XII.	30 17 59.5	79 37 7.6	23263
	.... XIII.	30 15 36.1	79 42 49.8	22313
	.... XIV.	30 21 51.7	79 43 30.6	25669
	.... XV.	30 16 13.5	79 54 25.7	22119
	.... XVI.	30 12 3.7	80 5 26.6	17994
20	.... XVII.	30 11 14.6	80 7 9.7	19153
	.... XVIII.	30 14 33.1	80 12 30.5	21439
	.... XIX.	30 12 18.1	80 15 42.6	22635
	.... XX.	30 9 29.3	80 16 44.3	20107
	.... XXI.	30 6 41.5	80 28 51.1	19099
25	.... XXII.	30 6 38.7	80 30 22.8	19497
	.... XXIII.	29 59 33.7	80 42 3.6	22727
	.... XXIV.	29 57 33.3	80 50 23.8	22138
	.... XXV.	29 52 35.7	80 51 36.5	22277
	Snowy Peak XXVI. (Himalaya.)	29 50 44.5	80 51 31.1	21015
30	.... XXVII.	29 49 42.8	80 54 10.2	20933
	Tsooni Temple.	29 39 33.7	79 22 4.2	6823.7
	Kathbana Ford	29 47 56.5	79 9 32.8	5785
	Sal Oak Tree.	29 34 14.5	79 24 4.7	7193.2
	Sachun Dhura Peak.	29 28 33.7	79 13 1.1	8433
35	Dara Giri Temple	29 47 41.7	79 17 50.1	7372.2
	Thatoot Peak.	29 49 54.9	79 20 50.4	9000.6
	Ahri Deo Peak.	29 45 42.7	79 25 8.2	7030.9
	Gana Nath Stockade.	29 45 [illegible]	79 30 29.6	6828.6
	Bleser Peak	29 42 1.9	79 35 42.4	7896.6
40	Shem Deo Temple.	29 36 44.8	79 40 33.9	6062.9
	Fort Moira.	29 35 7.9	79 29 49.4	5520.8
	Moitsher Peak.	29 28 12.1	79 20 40.7	7710.9
	Bandani Peak	29 33 16.3	79 32 24	6725.8
	Shem Deo. (Station.)	29 36 13.1	79 [illegible] 15.9	6923.3
45	Pin Nath Temple.	29 49 57.1	79 23 [illegible]9.2	7627.6
	Bagha Ling Temple	29 47 30.1	80 [illegible] 27.5	7646.5
	Kal Peak.	29 [illegible] 21.1	79 51 49.7	7796.7
	Kal (Station.)	29 43 14.5	79 51 29.3	6594.3
	Dhaj Peak.	29 39 34.9	80 7 45.1	8168.3
50	Thaeli Peak.	29 30 [illegible].9	80 [illegible] 27.2	8143.6

No.	Names of Places.	Latitudes.	Longitudes.	Elevations.
		° ′ ″ N.	° ′ ″ E.	Feet.
	Roghthi above Ascot. (Station.)	29 45 46.3	80 8 55.8	5502.9
	Sirsaot Temple.	29 43 28.9	80 5 9	6864.1
	Bárah Bhái Peak.	29 42 49.9	80 4 49.1	7805.4
	Húm Peak.	29 58 35.5	80 6 [illegible]	9847.[illegible]
55	Cutalgárh Fort.	29 24 13.9	79 53 58.4	6327.7
	Banco Peak.	29 20 36.1	80 [illegible]	6061.2
	Byothari Fort. (Dotea.)	29 33 9.7	80 15 53.3	5143.2
	Calí Nágh Peak.	29 51 36.1	79 57 45.4	7898.
	Charálékh P. (in Dotea.)	29 34 55.9	80 19 5.4	5544.4
60	Ronlacot. (Ditto.)	29 33 15.7	80 24 5.3	8291.1
	Go'al Lókh P. (Ditto.)	29 29 1.9	80 14 57	8104.8
	Chaumunh Temple.	29 35 41.9	79 18 35.9	6355.7
	Great Ganá Peak.	29 [illegible] 31.9	79 [illegible] 57.6	7192.2
	Asú Chúta Temple.	29 37 31.9	80 1[illegible] 1.4	7034.9
65	Cumbhpúr Temple.	29 38 17.5	79 15 [illegible]	6303.9
	Cát'h cí Nato Fort.	29 35 45.7	79 0 12.4	4978.1
	Lobalgar'h Fort.	29 58 4.3	79 10 [illegible]	6357.7
	Ascot Village.	29 45 17.5	80 10 25.9	5016.7
	Chipula Peak. (Bútan.)	29 54 42.1	80 16 [illegible]	13455.1
70	Rání Shica P. (Dotí.)	29 46 41.5	80 24 1.2	10132.3
	Shica P. (Ditto.)	29 44 31.9	80 21 10.5	9176.3
	Chand Nágh P.	29 37 37.3	[illegible]	7078.7
	Mount Lóbug (Summit of the Pass (a)	30 19 43.3	80 27 54.9	18370.6
	Goh Village. (Bútan.)	30 14 40.5	80 22 45.5	11486.3
75	Edge of the Calí R. below Ascot			3273.3
	Deo Dhúra Temple.	29 24 33	79 43 27	5669.6
	Khilpatí Stockade.	29 21 30	80 0 44	6324.8
	Chamáwat Cantonment.	29 19 45	79 56 27	5467.5
	Súí Peak.	29 25 27	79 55 10	5837.8
80	Háwal Bágh.	29 38 20	79 26 2	3889.
	Sitolí Stockade.	29 36 13	79 29 2	5127
	Mount Browne.	29 36 44	79 30 46	5705
	St. Mark's Tower.	29 35 40	79 30 28	5404
	Fort Almora.	29 35 30	79 30 0	5357
85	Cutír Mall.	29 37 32	79 27 9	5144
	Simtouca Peak. (Bútan.)	30 59 46	80 28 49.9	10632.2
	Jrúlí Village. (Ditto,)	29 57 40.1	80 26 24.7	6310
	Snowy Peak sb. Golaghí (Himalaya.)	29 8 19	80 39 38	21150.
	Tauglinj Ghatí. (Bútan.)	30 1 12	80 27 15	11551.0
90	Runju Village. (Ditto.)	30 57 48	80 25 13	6779
	Safusura Village. (Ditto,)	29 35 32	80 28 45	6211.8
	Cila, or Sualpunt. (Ditto.)	29 [illegible]	80 23 35.3	3218.6
	Cila Bridge over the Dhalí R. (Do.)			3811.2
	Confluence of Réla Ghar & Calí R. (Ditto.)	29 5[illegible] 56	80 24 0	3924.9
95	Camp below Lúma. (Ditto.)	29 [illegible] 18	80 23 [illegible]	6564.2
	Júma Village. (Bootan.)	29 [illegible] 57	80 23 27	8886.5
	Ratbí (Ditto,)	29 55 27	80 24 16	5931.2
	Shaedá (Ditto,)	29 48 31	80 0 16	4443.2
	Dingatbar, Village	29 47 23	79 58 55	4224.8
100	Thal Dehí Temple.	29 48 11	79 52 52	5128.1
	Khené Village.	29 50 43	79 51 52	5717.4
	Hauá cí Thán. (Temple.)	29 48 10	79 51 45	5703.5
	Odiarí Village.	29 43 12	79 53 53	5575.3
	Dhandalí. Ditto,	29 46 43	79 54 32	4341.5
105	Búdára. Ditto,	29 50 31	79 51 52	5730.6
	Loha Thal Ditto,	29 50 31	79 53 33	5734.2
	Dasuti Ditto,	29 51 30	79 52 0	5618.4
	Kauli Ditto,	29 50 50		

No	Names of Places.	Latitudes.	Longitudes.	Elevations.
		° ′ ″	° ′ ″	Feet.
	Garbia village. (Bútan.)	30 6 56 N.	80 41 32.6 E	10200.0
110	Mt. Namjang. (Himalaya.)	30 2 18.4	80 39 44.6	18398
	Trig. Station near Garbia.	30 6 1	80 39 46	10983.2
	Spar Bridge over Calapani R. (Bútan.)	30 0 7	80 42 23	12670.4
	Byás Rik'hi P. (Himalaya.)	30 9 28	80 46 2	19857.2
	Mandarin's Camp. (Bútan.)	30 11 19	80 44 18	14433.8
115	Ghatí, or Pass to Factory.	30 11 45	80 48 10	17597.8
	No. 1 of Cúsias. (Himalaya.)	30 13 17	80 45 0	22441.6
	No. 2, (Ditto.)	30 12 47	30 46 8	20991.8
	Kawa Lekh P. (Bútan.)	30 8 0	80 42 52	15245.4
	Station near confluence of the Gáli and Cálapání Rs. (Bootan.)	30 8 16	80 41 31	11341.4
120	Sithi Lekh P. (Himalaya.)	30 7 28	80 40 16	15811.4
	Bouling village. (Bútan.)	30 [illegible] 12	80 26 49	——
	Phakal ditto. (Ditto.)	30 3 21	80 27 17	——
	Cálapání Fountain.	30 10 30	80 43 28	——
	Deodar Ghat. (b)	29 28 2	79 26 40	6273.7
125	Ghagar Ghat. (c)	29 24 25	79 23 3	7696.1
	Lobaraat Stockade.	29 27 45	79 20 7	6732.4
	Surface of the Lake, Bhesm Tal. (d)	29 19 13	79 23 53	4271.5
	Khasanpúr (Rohilcund.)	29 12 18	78 48 54.1	——
	Chámrowa. (Ditto.)	28 46 26.9	78 50 10.8	——
130	Afzal Khan's Palace. (Ditto.)	28 43. 53	78 52 9.5	——
	APPROXIMATIONS. (e)			
	Taclacot. (Chinese Factory.)	30 12 43	81 2 10	14500
	Lake Mansarovar. (Ditto ditto.)	30 28 7	81 9.10	

(d) *A ch'hobitra*, or Sat'hí at the southern extremity of the lake.

REFERENCES.

No. 73. (a.) With extreme difficulty, and I may add, with extreme peril, I was fortunate enough to accomplish the passage of *Lébíg Ghátí*, without accident on the 6th of June 1816.

Nos. 124, 125, (b.) (c.) The new road from *Bamauri* to *Almora*, recently constructed at the expence of the British Government, crosses both these points.

No. 126, (d.) The shape of the lake *Bhím Tál* approaches more nearly to a triangle, than to any other regular figure, the length of the longest side is about a mile, and that of the shortest five furlongs. Its extent appears to have been much greater at some former period; and the diminution it has experienced, is evidently to be attributed to deposition by the streams flowing into it. There is still depth of water

sufficient for a first rate line of battle ship to ride at anchor. Lieut. STEPHEN, who had a small canoe on the lake, struck soundings in 64 feet or nearly 11 fathoms, about the central parts, and the banks shelve very rapidly.

APPROXIMATION 2; the position of the pass leading to *Taclacot* is already given by my survey; the direction of *Taclacot* was pointed to me north 82° east from thence, and its distance from the eastern descent is one day's journey for laden goats; the above bearing, with a horizontal distance of eight miles from the summit of the pass, cannot give a very erroneous position to *Taclacot*.

THE direction of *Manfarovar* was also described to me by many persons, who had visited it to be about north 90° east from *Taclacot* and the distance two day's journey, for laden goats, which as the road is level may perhaps be 14 miles.

By this information I have assigned, what I imagine to be the geographical position nearly of the monastery, mentioned by Mr. MOORCROFT, and which I conclude to be situated on the western bank of the lake, but as *Manfarovar* is stated to be of an elliptical shape, and to have its diameters equal to eleven and seven miles respectively, it seems at least probable that the latitude and longitude, I have given will fall somewhere within the limits of the lake itself especially if it be remembered, that the place at which my information was obtained, is not so much as twenty miles distant from *Manfarovar*.

ALL the *Tartars* and *Bhútias* who were with me were of opinion, that the eastern descent of *Taclacot Ghátt* was not greater than the western, and hence we may conclude that the elevation of the lofty table

land of central *Asia* is nearly the same, as that of the *Deba's* camp, (No. 114,) or 14,500 feet above the level of the sea.

Although several of the preceding latitudes, and longitudes, are inserted to the tenth part of a second, as given by the calculations, it is by no means intended to convey an idea that the principles, on which this survey is conducted, can attain to that great degree of exactness.

Every figure of even the most trivial computation will be found in the field books, which I have transmitted to the Surveyor General's Office: in so vast a work, where the survey in the field and all its dependant computations rest with an individual, a few errors may be excused: some I have discovered and corrected, though none have been pointed out to me, but many still remain.

Upon the whole, I flatter myself, that in the more essential parts, this survey will bear comparison with any, that have been performed in Bengal, and I can only lament that I have not been able to collect the materials into a map of suitable external appearance.

VI.

CEREMONIES

OBSERVED AT THE CORONATION OF A HINDU RAJA.

By Mr. BROWN.

As the observance of any public ceremonies amongst the *Hindu* population of *India* is daily falling into disuse, and as they will consequently be known at no distant period from tradition alone, it may perhaps form part of the objects of the Asiatic Society, to procure such descriptions of them as eye-witnesses of their performances are qualified to contribute, and to preserve in the transactions of the society, such memorials of their past existence—with this view I beg leave to offer to the acceptance of the society the following account of the coronation of the Raja of *Colastri*, at which I happened to be present.

In order fully to comprehend the causes that then led to that ceremony, it is necessary for me to state the political situation of the *Rāj* of *Colastri* at that period.

The arms of the *Tartar* conquerors of *India* never penetrated into *Malabar*, the inhabitants of which preserved their ancient government, religion, and customs, until the invasion of Hyder Ally from the neighbouring province of *Canara* about the year 1768, with a numerous army, put an end to the *Hindu* government, by the expulsion of the Rajas and chief men, most of whom fled to *Travancore*. As the *Mapillas* chieftain of *Cananore*, Ali Raja, had urged Hyder to, and assisted him in this conquest, he, as a reward put him in possession of the *Rāj* of

Colastri on condition of paying an annual tribute. The government of the country being then transferred from the *Hindus* to fanatical *Musselmans* was, during the course of 12 years which Ali Raja held it, almost completely depopulated; murder and rapine prevailed in every quarter, so that few *Hindus* remained in it who had the means of getting to *Travancore*. During this long period, little of the stipulated tribute had been paid, and Hyder therefore willingly listened to proposals made to him by one of the princes of the *Colastri* family, (who had been protected in the Honorable Company's settlement of *Tellichery*) to pay him tribute and restored to his country. The negociation was carried on through DOMINGOS RODRIGUES, the Company's linguist, a man of great wealth, who becoming security for the payment of the tribute, the Raja was put in possession of the *Raj*, in 1776-7, with full powers to re-establish the ancient government. This was immediately done; the exiles were recalled, and reinstated in their landed property, but the country from so long a course of oppression and spoliation, afforded slender means of realizing the tribute; whilst the residents, under the name of *harcaras*, placed with the Raja to receive the tribute and to observe and report his actions, augmented his distress by their rapaciousness. The first year's tribute was advanced by DOMINGOS RODRIGUES, but subsequently the revenues still continued unequal to the demands on them, and therefore, after the country had been restored to some kind of order, the expedient of crowning the senior Raja, for the purpose of raising money, was resolved on. It is here necessary to explain that the law of succession adopted in this family and indeed in all the Raja families of *Malabar*, is, that the senior male, by the female line, succeeds to the first station of *Colastri* Raja, in whose name the government is conducted by an acting Raja whom he appoints, and who is in fact the ruler, the other after being crowned, retiring to a certain fort with all the ensigns and exterior marks of dignity, where he passes his time in the performance of religious ceremonies. What probably rendered

the adoption of this mode of delegated government necessary is, that as the number of princes in the family is generally considerable, (the sons of all the daughters succeeding each other, according to priority of birth) the senior is always far advanced in years, and past the prime of active life before he comes to that dignity. The senior raja, in the present instance was a very aged man, not less, I judged, than 70 years of age. He had hitherto remained in *Travancore*, probably to avoid the expence necessary for his establishment, but was now brought from thence, that the finances of the *Raj* might be recruited with the contributions due, by custom, not only from its own subjects but from the other rajas and chieftains connected with it, on the performance of this ceremony: at which also attended deputies from the settlement of *Mahi* and *Tellicherry*, were presenting a box containing a certain sum in gold, in conformity to ancient customs. The *Bramins* having fixed on an auspicious day in the month of December 1778-9 notice of it, and invitations were sent far and near, and great preparations were made by the ruling raja for the accommodation, and entertainment of the multitude that were expected to assemble from all parts of *Malabar* and the countries of *Cochin*, *Travancore* and *Palghat*.

The place of immemorial custom had prescribed for the performance of the ceremony was a fort, named *Muday*, situated between the rivers of *Ponnani* and *Cavay*, in an open spot, and more spacious than *Malabar* forts generally are. Here on an elevated spot under a canopy, a kind of throne, but not higher than a common chair, was placed. About one o'clock p. m. the raja was brought in a covered palankeen, attended by many *bramins*, to this chair, and seated in it, but concealed from the spectators by *pordas* held up before him, whilst the people were made to fall back to a distance of 20 to 30 yards in front, and *bramins* were there stationed to prevent any person going beyond those

limits. The concourse of people assembled was very great. Into the fort the chief people only had been admitted; the multitude were without the walls in vast numbers, but from the elevation of the spot on which the throne was placed most of them could see it.

The propitious moment being arrived, the *perdas* were withdrawn and the raja exposed to view with the crown on his head. Various rites were then performed by the *bramins*, whilst others recited invocations and chaunted stanzas appropriate to the occasion. This continued for about half an hour, when the chief *bramin*, or priest of the Raj advanced, having a flat silver dish in his left hand, containing a little fine unbolted rice. He approached so close to the raja as to be able to reach the crown with his hand, stopped and recited a prayer or invocation. He then took a little of the rice in his right hand and dropped it on the crown. This he repeated three times letting the rice fall slowly, whilst he at same time continued to proclaim in a very loud voice the new titles of the raja with invocations or prayers composed no doubt for the august ceremony.

The silence of the multitude without, as well as within the fort, during all this was admirable. The awe and reverence with which they beheld the rites and listened to the *bramins* was so great, that not a breath was to be heard whilst they continued, so that the voices of the *bramins* were distinctly heard out of the fort; but the moment for adoration, which was that when the last rite with the rice was completed, was no sooner come, than a simultaneous shout burst from the whole, so loud and sudden and so thrilling to me, from its being totally unexpected, that it seemed the shout of Milton's pandæmonium realized.

The adoration at the same time began, and continued as long as the Raja remained exposed, which was above an hour, during which the

offerings were presented and received by the attendants. During the same time gifts of cloths and money were distributed amongst the *Bramins* and their women, the number of whom alone was immense, all of that cast of the adjacent countries and many even from *Tanjore* having assembled. For their accomodation also, very extensive wooden buildings had been erected, in which they were feasted with dressed victuals, consisting of rice, dhál, ghee, curries of various vegetables, with papadoms, (fine cakes, made of gram flour, and a fine species of alkali, which gives them an agreeable salt taste and serves the purpose of yeast, making them rise and become very crisp when fried) plantains and other fruits. This entertainment, which was for the *bramins* and their families only, continued three days, twice each day.

The gestures made use of on this occasion to express their adoration, were sufficiently remarkable to merit a description. The person standing erect lifts his hands to his face and joins them open, the fingers stretched and reaching a little above the eyes; the fingers are then drawn down to the palm, and the hands drawn back from each other to the distance of eight or ten inches, then replaced as before, and the same motions repeated, which when performed by every individual of so great a multitude formed a very singular scene.

The crown was of gold, but the distance at which I was placed, prevented me from noting any thing but its form, which resembled that of the *Tiara*, worn by the *Roman Pontiffs*, before it was disfigured into a triple crown by the arrogance of Boniface and Benedict. When we consider with what minuteness the *Hindus* adhere, even in matters of minor importance to the practices of their ancestors, we may conclude that the form of this crown was very ancient, and is therefore worthy of remark as being different from that of any diadem worn by princes either now or at former periods; but that the

cap of ceremony of the high priest of the Temple of *Jerusalem* was not unlike it.

This ceremony on the whole affords two subjects worthy of consideration. First, the rite of sprinkling rice over the crown, whilst on the head of the raja, so different from any practice in the west of modern or ancient times. The rite now in use of anointing princes at their coronations is of modern institution, and generally admitted to have been borrowed or imitated from the Jews. Secondly, the circumstance of its being a ceremony arising out of a feudal system of government, at which all the vassels were obliged to appear, and to contribute to the expence of it, each according to his rank; and that it should have been resorted to for the purpose of filling the raja's coffers in a similar manner to that in which our own princes often rendered the feudal ceremonies subservient to similar purposes.

I have the honor to be, Sir,

Your most obedient servant,

A. BROWN.

VII.

Analysis of the SNAKE-STONE. *By* J. DAVY, *M. D. F. S.*

SNAKE-STONES, it is well known in *India*, are substances employed by the natives as remedies against the bite of venomous serpents.

The forms of these stones and their external characters have already been described by more than one author, but I am not aware, that any account has been published, yet, of their chemical nature.

For those stones which I have examined, I am indebted to the Honorable SIR ALEXANDER JOHNSTONE, Chief Justice of *Ceylon*. They were of three different kinds.

The first kind were fibril bodies, round or oval, nearly white toward their circumference and black or brown at their centre; they were polished, possessed a slight degree of lustre and had a pretty appearance, on account of which and their supposed virtues, they are occasionally formed into ear-ornaments: they were of moderate hardness, easily cut by the knife, but not scratched by the nail; when breathed on they emitted an earthy smell like clay, and when applied to the tongue or any moist surface, they firmly adhered to it.

Between the fingers they gradually became perfectly white and soft without their substance, yet they emitted no fume or odour or

flame. Put into dilute nitric acid a very slight effervescence was produced which was momentary, when the stone was in powder; in a few hours the whole of the stone was dissolved with the exception of a very minute portion of carbonaceous matter. This solution on the addition of ammonia afforded a copious precipitate, which was insoluble in weak oxalic acid. The precipitate being separated by filtration, the fluid was rendered turbid by the last mentioned acid.

RESULTS which prove that these stones are composed of phosphate of lime, with a little carbonate of lime and slight traces of carbon. Thus their composition is the same as that of bone partially calcined, which I have no doubt, they are in reality: their physical properties are those of calcined bone as well as their chemical nature; calcined bone like the stones admits of being polished, affords when breathed on an earthy smell, adheres to moist surfaces and in fact has every real property which these stones possess.

ANOTHER kind of snake-stone, of which I saw only a single specimen, was a small oval body smooth and shining, externally black, internally grey; it had no earthy smell when breathed on, and had no absorbent or adhesive power. By the person who presented it to Sir ALEXANDER JOHNSTONE, it was much valued and for adequate reasons, if true, it saved the lives of four men at least.

BEFORE the blow-pipe it emitted a slight smell like that of vegetable matter burning and became white. In dilute nitric acid it dissolved and effervesced strongly, and until the whole was dissolved the effervescence continued. The solution was not precipitated by ammonia but copiously by carbonate of ammonia. The precipitate before the blow-pipe was converted into pure quick lime.

From these results it is evident, that this highly valued stone is merely carbonate of lime coloured by a little vegetable matter.

The third and last kind of snake-stone I have to describe was of a cylindrical form, slightly curved about an inch in length and in circumference about three quarters of an inch; it had a smooth shining surface, was dark bottle green, pretty hard and rather brittle, when broken it proved to be composed of concentric thin layers: it had the odour of musk in a slight degree: it did not possess any absorbent power.

Before the blow-pipe it decrepitated, fell to pieces, blackened, took fire, burnt with a very red flame and emitted much smoke. The coal it left was voluminous; the ash this coal afforded when incinerated was small in quantity, and consisted chiefly of carbonate and phosphate of lime.

The nature of this stone I did not farther investigate. The preceding results satisfied me that it was a Bezoar which Sir ALEXANDER JOHNSTONE previously suspected.

Are these so-called snake-stones deserving of the reputation which they have acquired among the natives; are their virtues real or imaginary? By putting the question in a different form it may be solved more easily. Is a calcined bone or a fragment of carbonate of lime, or a concretion formed in the intestines of an animal an antidote against the poison of snakes? Every one acquainted with the animal economy and the effects, and the mode of operation of the poisonous snakes will (I think) decidedly answer in the negative. The two kinds last described can have no physical or che-

[illegible] effect whatever as local applications: and the first kind can have little effect even as an absorbent; were it indeed possessed of the strong absorbent power, I am confident its application would be useless, and worse than useless, as interfering with the employment of efficient means of cure.

ANOTHER question may be put—Is it not curious that the stones if possessed of no real power should be so much confided in as they are, and if destitute of all virtue as an antidote, should be esteemed as an antidote, and not only by ignorant *Indians*, but even by many *Europeans*.—In reply it may be generally remarked, error is popular, *quod mavult homo esse verum id facile credit*: appearances are deceptive and correct conclusions difficultly drawn, not to mention the effects of superstition and its influence on the minds of *Indians*. To be more particular, it may be remarked farther, that I believe the persons who have used snake-stones have (independent of other sources of error) been deceived by applying them in many instances to the bite of snakes supposed to be, but not really venomous, and in other instances in attributing to the stones, the cure which was due to nature alone.

THE majority of reptiles supposed by the natives to be poisonous are harmless. Though I have been in *Ceylon* only a few months, I have seen [illegible] and examined twelve different species of snakes; of these only one kind was believed by the natives to be harmless. Notwithstanding on the whole number, only [illegible] species proved to be poisonous. About a week ago a snake was brought me by [illegible] *Mahabilla*. Though dead, the man who carried it, was under great apprehensions of danger and took care of himself by carrying it tied to the end of a long pole. The *Mahabilla* [illegible] the man's fears, saying it was very venomous, in an hour (he alleged) the man who is bitten by it dies.—Yet on examination, I found

that this snake had no fang-teeth or poison-bag, and of course was harmless: of the three poisonous kind, the bite of one I have ascertained, is never fatal even to small animals and much less to man. The serpent alluded to, is that called here the *carawilla*. Its poison acts in a peculiar manner, occasioning much swelling and pain in the part bitten. The swelling gradually abates. Disagreeable suppurating ulcers are a frequent consequence; but the recovery is spontaneous and certain. I may relate an instance in which a snake-stone gained much credit applied to the bite of a serpent of this kind. The story was thus told me by a spectator. A native servant was bitten in the leg by a serpent. A snake charmer was immediately sent for. He came speedily, yet before he arrived, the leg and thigh were much swollen. The charmer applied his snake stone which was a long time continued. In about three hours the pain which at first was excruciating had nearly ceased, and the swelling in about three hours more had subsided, and the man who was travelling on foot was able to pursue his journey, which I have no doubt he would have been able to have done just as soon, if no stone had been applied.

The bite of the other two poisonous snakes the cobra di capello (coluber naja) and the Polonga (a species of coluber) is thought by most of the natives to be absolutely mortal, which is far from the truth. The effect of the bite depends on a variety of circumstances that people in general leave out of consideration. I have made a number of experiments with both kinds, and can speak from my own experience. The poison of these snakes is soon exhausted, when of course their bite is innocent. And though the poison be not exhausted in the majority of cases of the bite of the cobra di capello, and in many of the polonga, it is not sufficiently virulent to cause the death of any animal excepting such as are small and weak.

Of all errors practical errors are the worst; and to this class of errors I flatter myself I have proved that the belief of snake-stones being antidote against the poison of snakes belongs. The sooner such a belief is exploded the better. Many a life in all probability has been sacrificed to it, that might have been saved by efficient means of cure timely applied, and much human suffering undergone, that might have been relieved, had real, instead of these imaginary remedies been employed.

ADDITIONAL OBSERVATIONS, BY THE SECRETARY.

THE experiments of Dr. DAVY have satisfactorily established the nature of those substances termed snake-stones, and have fully corroborated the notions entertained of their composition and inefficacy; the conclusions that he has drawn however, were not unknown either in the east or west, and it may not be uninteresting to take a cursory view of the opinions which have been expressed of their nature and properties, by preceding writers in these kingdoms, as well as in Europe, as a supplement to Dr. DAVY's analytical enquiries.

THE modern introduction of the snake-stone to the attention of the philosophers of Europe, appears to have occurred in the latter part of the 17th century. In 1662 some specimens were brought from India by three Franciscan Friars, and deposited in the museum of the Grand Duke of *Tuscany*, where they were seen, and described by the naturalist *Redi*; about the same time, some were sent from *Java* by Sir PHILIBERTO VERNATI, to Sir ROBERT MORAY, for the repository of the Royal Society: they had also some short time before, been described in THEVENOT's relations of divers considerable voyages, and they were again mentioned in TAVERNIER's Travels in the East Indies.

In all these cases an erroneous opinion was expressed of the origin of this stone; it was said to be found in the head of the Coluber Naja and other serpents, and was thence termed pietra del serpente cobra de cabelo; lapis serpentis cobra de cabelo dicti; pedra de cobra, pierre de serpent, the snake stone, and another kind was named from the place whence it was supposed to be brought, pedra del serpente di Mombazza, or lapis serpentis de Mombazza; the description of which given by Thevenot, is thus cited in the Philosophical Transactions of 1665.

"In the East Indies, and in the kingdom of *Quasy* in *China*, there is found a stone in the head of a certain serpent (which they call by a name signifying hairy serpent) which heals the bitings of the same serpent, that else would kill in 24 hours. This stone is round, white in the middle, and about the edges, blue or greenish. Being applied to the wound it adheres to it of itself, and falls not off, but after it hath sucked the poison, when they wash it in milk, wherein it is left awhile, till it return to its natural condition. It is a rare stone, for if it be put a second time upon the wound, and stick to it, 'tis a sign it had not sucked all the venom during its first application; but if it stick not, 'tis a mark that all the poison was drawn out at first."

The account thus given of the origin of the snake stone appears not to have received implicit credence; Tavernier considers it to be a medicinal compound, and Kæmpfer (Amœnitat exot.) looks upon it as an artificial fabrication. Thevenot states particularly that the town of *Diu* was celebrated for its manufacture, and in the Philosophical Transactions for 1749-50, in a communication from Sir Hans Sloane, he states on the authority of Doctor Alexander Stuart, recently returned from the East Indies, that the snake stones "were not taken out of "a serpent's head, but made of the bones of the small buffalo in the

snakes, (by which their coaches are drawn instead of horses,) the bones being half calcined or charred by the dung of the same buffalo," the same is stated by PARR in his Medical Dictionary, in which the lapis colubrinus is said to be made of hartshorn burnt to blackness, and afterwards polished, the whole corroborating the conclusion of Dr. DAVY, that one species of the snake stone is nothing more than bone partially calcined.

THE notion that a gem or stone of great value and miraculous properties was formed in the head of a snake, is one of considerable antiquity and wide circulation, and both in its early introduction and subsequent revival is manifestly of *Indian* origin. SOLINUS in his chapter on Ethiopia states, that, "excidiur e cerebris draconum, dracontias "lapis," and he adds, usu ejus orientis Reges præcipue gloriantur, quoting *Sotacus* or Σωτακος an ancient *Greek* author who wrote περι λιθων as having seen this extraordinary gem. *Philostratus* as cited by *Salmasius* is still more precise as to the locality of the stone, and declares that the natives of *India* or Ινδοι cut off the head of the serpent in order to extract the stone contained in it: the same account of the origin of this stone occurs in *Pliny*, who mentions its being procured by the natives of *India* by decapitating the serpent whilst asleep, and who also notices the medical application by the Scythians of another stone said to be found in the head of the viper, which is used as an antidote: (viperæ) dissecant quidem Scythæ inter aures, ad eximendum lapillum, quem aiunt ab eâ devorari territa.

THE *gem* of the classical writers, and which according to them is not a stone at all, unless it be taken from the head of a living snake, is evidently the wonderful *Carbuncle* of the romance writers. It is probably also the same as the snake stone of modern travellers, although known to them only in its medicinal character: both are the

offspring of *Indian* fable, and we find accordingly in the *Sanskrit* poets frequent allusions to the stone in the head of the snake, and in the *Charaka* and *Sushruta* two medical works of high authority and great reputed antiquity, the सर्पमणिः *Serpamani* or snake gem, is enumerated amongst the antidotes, and designated also by the synonime नागमणि *Naganani* or serpent stone. The *Mohammedan* writers make similar mention of the snake stone, which according to the author of the *Akhtiyar Beddi* is found in the head of the *Afsi* or viper: the author of the *Tohfat al Momenin* calls it *Hajar al Haiyah* and describes the *Haiyah* as a kind of snake; the latter called also *Marmoheen* or snake stone, and the former adds another name *Bádzehr*, or Bezoar, considering it as the animal species of that celebrated alexipharmic, which appears in general to be the snake stone of the East, and which was one of the three kinds examined by Dr. Davy, as well as one of those described in the communication referred to above, made by Sir Hans Sloane to the President of the Royal Society.

The *Bezoar* according to our medical writers was unknown to the *Greeks*, and was first introduced to the knowledge of *Europe*, by the *Arabic* writers. There does not seem indeed to be any mention of it in the works of Aristotle or of Pliny, though we have the authority of Ibni Telmiz or Hebbatallah, a christian physician who lived at the court of the Abbasside Khalif Mocteffi, about the middle of the 10th century, and the author of a voluminous medical work entitled *Al Moghni*, * for its being known to the *Greeks*, as he cites Aristotle as stating its being brought from *India* and *China*. Another author also

* This statement rests upon the authority of the author of the *Tohfat al Momenin*. D'Herbelot however cites the great work entitled *Al Moghni* to Ebn Beitár, and another *Moghni al tib* to the son of Ben Telmiz, or Seid Ben Hebbatallah. They may both be right as *Moghni* signifying, the enlighter or contents, form part of the title of many works, especially on medicine and law.

Ebn Beitar closes the same writer for its dose, in his chapter on antidotes: this testimony, which is rather suspicious, and which may have proceeded from the desire of the authors to shelter themselves under a great name, would only add an additional fact to the many we already possess, evincing the possession by the Arabs of many classical works, especially on the sciences, which have not come down to later ages, and will leave Europe still indebted to the Arabs or Persians, for its acquaintance with the substances called Bezoars.

The name from which the modern appellation is derived, establishes the priority of knowledge in favour of the Persians, as Pázehr, Pádzehr, or Bádzehr, are Persian words—the author of the Jawáhir Náma explains the term, as signifying the repeller of poison, and Meichusei's Etymology therefore is not without original support پاد زهر pad-zehr vel. q. Padizehr et پاد زهر Badzehr, compositum ex پاد Pad-et زهر venenum tollens, pellens, alexi-pharmicum et lapis Bezoar. It may therefore be termed properly the poison stone, which is equally the signification of its Arabic name, Hajar-ul Sam, and the name by which it is usually known of Zehr Mehereh.

Oriental writers distinguish Bezoar into two classes, or mineral and animal: the mineral sort is procured, according to Aristotle says Ibn Telmis, from India and Cassay according to Abu Hinduyah, from the mountain Zera, and in Cirman: it is perhaps the fossile Bezoar of Europe, a kind of stone resembling the animal Bezoar, being formed of concentric layers, and similar to it externally, in size and shape.

The other kind of Pád-zehr is the animal sort, called by the Arabs very accurately, Hejer al Ils or goat stone; it being in fact a calculous concre-

tion found in the stomach of animals of the goat kind especially [illegible] is justly stated by the author of the *Tohfet al Momenin*, who takes no notice of the fabulous generation of it by the successively congealed rheum flowing from the eyes of a sort of camel or deer supposed to feed upon snakes, as mentioned in the *Khwás al Ehjár* and other works: the *Akhtyrát Badi* is singular in deriving the animal *Bezoar* from the head of a snake, although its presence in the porcupine, apt and ox is noticed in several works, agreeably to the information given by TAVERNIER, who says, with great truth, J'ay eu la curiosité de me bien instruire de tout ce qui se peut scavoir du *Bezoar*: of both species of *Bezoar*, many varieties, classed according to the shades of colour, are enumerated by the original authorities.

It is foreign to the object of the present remarks, to notice the many wonderful properties ascribed by oriental writers to the *Bezoar*, or to advert to any, but its supposed alexipharmic power. In this respect, as well as in the method of its application, it answers to the accounts given by THEVENOT and KÆMPFER of the virtues of the snake stone, and leaves no doubt of their general identity.

The only remaining conclusion resulting from Dr. DAVY's enquiries, regards the inefficacy of these substances, be they what they may: the credulity that prevailed on this head, has not been confined to the natives of the East, nor even to those who took the oriental fables upon trust, for TAVERNIER, from information gathered on the spot, appears to be quite satisfied of their properties; and no less a personage, than the President of the College of Physicians, Doctor BAYNMAN, informed Sir HANS SLOANE "with great admiration that he had seen the great effects upon the bite of a viper of the snake stone, or serpent stone as "it is called, before King CHARLES 2d, who was a great lover of such

"natural experiments." We know perfectly well now, what to think of such testimony, and the absolute inertness of these substances is indisputably established: in this respect indeed the preceding experiments only corroborate the inference of KÆMPFER, "istis lapidibus "nihil efficacie inesse, nisi quam actuali frigiditate suâ, vel absorbendo "præstant," and we have the authority of FONTANA, for its being known from the experiments of those two great *Italian* naturalists, *Redi* and *Valisnieri*, that the snake stone has no efficacy in curing the bite of vipers.

VIII.

AN ACCOUNT OF VENOMOUS SEA SNAKES, ON THE COAST OF MADRAS.

BY

DR. MEWBIE,

COMMUNICATED BY COLONEL MACKENZIE.

Soon after the opening of the Bar in the month of October 1819, reports were circulated at *Madras*, that a great shoal of sea snakes had entered the river, and that many natives in crossing it had been bitten and had died. These reports caused so serious an alarm among the natives, that they attracted the attention of the superintendent of the police, who on enquiry ascertained that three individuals after crossing the river *had died*, and their death had been occasioned (as was universally believed) by these snakes. In consequence of this information, a reward was offered for each sea snake caught on the condition of being carried to the police office.

PANDALS were erected opposite to the two principal fords on the river, where under my medical superintendence skilful natives provided with Eau-de-luce and other remedies were constantly stationed, and who were directed to afford immediate aid to those persons who might be unfortunately bitten; this little establishment was continued until the river had become nearly dry; during its existence fifteen persons (actually bitten) were carried to the *Pandals*, all of them in a greater or less degree exhibiting those symptoms consequent upon the action of a powerful animal poison on the system; to all of them, the remedies prescribed were promptly administered, and with the happi-

effected. As two of these cases came under my own immediate observation, I have detailed them below, from notes carefully taken on the spot, during the continuance of the symptoms, and the exhibition of the remedies for their relief. To these two cases I have added the progress and result of an experiment, farther corroborative of the dangerous character of these unwelcome visitors.

In consequence of the reward offered by the police, from two to three hundred snakes were caught alive, and chiefly by fishermen who were either fearless or unconscious of any danger from them.

Among those caught, there appeared to be a considerable variety, but far the greater number were of the species *Hydrus major* and *Hydrus gracilis*, of both, several were very accurately examined by my friend Mr. Ryder of the Mint, and some well prepared and preserved specimens have been sent by him to a gentleman in England.

From a comparison of these with the description given by Doctor Shaw in his excellent Zoology, there can be no doubt as to the character of the snakes which made their appearance in the *Madras* river.

I shall in substance quote Doctor Shaw's characteristics.

HYDRUS MAJOR.

H. Lividus, fasciis decurrentibus fuscis, squamis hexagonis abrupte carinatis.

Its length is more than three feet, its colour pale or livid, marked throughout the whole length of the back by a series of large transverse semi decurrent dusky bands; the tail banded more deeply or so as to shew less of the ground colour, it is much flattened at the beginning or place of the vent, and then widens considerably towards the tip, which is obtusely pointed; the length of the tail is about four inches

[illegible] fragile; interior tenuis, [illegible] membranaceus, [illegible] *receptaculum* centrale, [illegible] apice [illegible] affigens, demum liberum. — *Albumen* [illegible] seminis conformis, hinc gibbosus. — *Cotyledones* amygdalinæ carnosæ, valde inæquales, una supra alteram [illegible] *Radicula* parva [illegible] cotyledonum [illegible] valvatim [illegible], [illegible].

Observations. I have already hinted above at the great affinity which exists between this species and Thunberg's *Sasanqua*, *Flora Japon.* 278. t. 50; the latter differs specifically in having blunter and smaller leaves, solitary terminal flowers, a long style and villous capsules; its size is also much larger than that of our plant, which never grows beyond the height of a small tree. The figure of that species in Lord MACARTNEY's Embassy to China, vol. II. p. 367 [illegible] under with our plant, but its leaves still want the decided acumen, besides being more deeply serrated. The common *Camellia* also has more firm and shining leaves with stronger serratures, its flowers are much larger and the petals of a leathery thick texture.

On referring to the drawings of the Botanic Garden which were [illegible] in the latter part of 1814, during the Superintendence of my [illegible] friend and predecessor Dr. FRANCIS HAMILTON (late BUCHANAN) I find, he has figured a species of Camellia under the name of *Chamegoria*, so called by the natives inhabiting the mountainous countries bordering on *Sylhet*, from whence it was sent by my indefatigable assistant, Mr. M. R. SMITH, who observes, in his letter accompanying the specimen, that it grows to the height of about 7 feet, and is covered in December with white [illegible] blossoms. I am unable to discover the least difference between that and the *Tipas* plant, and hence I am not considering them as one and the same species.

Since the preceding account was written I have had an opportunity of comparing my plant with the description and figure of *Camellia oleifera* published by Mr. CLARK ABEL in his interesting journey to the interior of *China* (p. 174 c. icone, et p. 363). These two species are unquestionable very like each other; that from *Napal* may however, be distinguished by having larger acuminate leaves, not altogether destitute of nerves and but slightly marked, on their under surface, with elevated dots, which are only observable by means of a powerful lens; its flowers being smaller and its style much shorter than that figured in the plate attached to Mr. ABEL's description. The variety mentioned p. 199, has still greater affinity to my tree.

The leaves of the *Napal* tree have a very strong but transient smell of Tea; but their infusion, possesses only to a very slight degree its flavour, owing perhaps as Mr. GARDNER justly observes, to the defective manner of gathering and drying them for the trials which he instituted. It has been ascertained by my esteemed friend that the Napalese extract an oil from the seed of the *Kissi* by pressure, which is much valued by them as a medicine. The seedlings reared in the botanic garden at *Calcutta* are thriving very well.

The stem and branches of this tree are subject to the growth of large sessile excrescences, perhaps a species of parasitical fungus, of an oval form and spongy texture which are said to be very poisonous. They have been repeatedly sent to me in a dried state attached to specimens of the *Camellia*, but I have as yet not been able to ascertain their specific nature.

Ten minutes had now elapsed since she had been carried to the *Pandal*, and in about three minutes more a tea spoonful of the Eau-de-luce was given which almost immediately produced violent vomiting and caused a profuse perspiration to be thrown out over every part of her body. On putting a little salt into her mouth, she said it was not salt but sugar, the natives deemed this an infallible sign of still continued danger.

Notwithstanding her improved symptoms an additional tea spoonful of the Eau-de-luce was given, and a fresh application of the nitric acid was made to the wound from which (she said) she now felt no pain. From this period she continued to recover, and in about an hour after she had been carried to the *Pandal*, she was entirely relieved; complaining, only of a numbness in the leg and thigh above the wound, which sensation continued for three or four days afterwards.

CASE II.

About half past eight A. M. *Mahomed* a lascar, was carried to the *Pandal*, said to have been bitten by a snake, about the middle of the river, advancing a few paces, after having quitted the bank he fell down violently convulsed: when brought in, his breathing was laborious, his face livid, his skin cold and clammy, his pulse was difficultly felt at the temples, but it was feeble at the wrist, his urine and fæces passed involuntarily from him, a quantity of foam and froth was ejected violently from between his closed teeth; with some difficulty, two small wounds were discovered on the outer edge of the left foot, which on being pressed bled a little, a tourniquette was instantly applied above the wound, which at the same instant was laid open to the extent of nearly an inch in this manner + and the carbonate of ammonia well soaked in the nitric acid applied to it—a tea spoonful of Eau-

de-luce in diluted brandy was with difficulty poured down his throat, which quantity was repeated every five minutes—after the third dose the spasms were relieved, his skin became warm, and he appeared to be sick at stomach, after the fourth dose, he retched violently, and brought up a small quantity of phlegm and a profuse perspiration was thrown out. I now considered his danger as much lessened, although he still continued insensible—the Eau-de-luce was continued and a fresh quantity of the alkali and acid was applied to the wound, in about 35 minutes after his admission, and after having taken seven doses of the Eau-de-luce, two of which were rejected, he was greatly relieved and spoke. On putting a little salt into his mouth he said it tasted *sour*, in about an hour afterwards he quitted the *Pendaul*—complaining only that his throat was burnt, and that he felt as if he had no left leg: this last sensation as in the former case continued for many days.

THIRTEEN others in the course of one month were carried into the *Pendauls*, and all of them were relieved by the same means promptly administered—the two cases detailed are however sufficient to prove the dangerous character of the sea snakes, which in such numbers entered the river, and I entertain the strongest conviction that had not immediate and powerful remedies been applied many of those bitten must have perished.

EXPERIMENT.

A LARGE healthy chicken was exposed to a Hydrus major nearly four feet long, which had been caught 12 hours, during which period it was kept in a vessel filled with fresh water—the chicken was made to press upon the head and body of the snake, but did not succeed in rousing it—upon which the Hydrus was taken out of the vessel and permitted to roll about in the open verandah in the presence of several people, the chicken was then presented to it, made to press upon its

heads, which at length irritated the Hydrus which was seen to bite at the chickens foot—the bird was immediately withdrawn—the marks of the fangs were perceptable though not distinctly so: but in about 10 minutes from this period it appeared to droop, and to have a slight convulsive flutter in both wings. In three minutes more it was decidedly convulsed, and at the end of 19 minutes from the period of being bitten it suddenly dropped down quite dead.

REMARKS.

From the result of the experiment, and from a consideration of the symptoms detailed in the two cases and corroborated in a greater or less degree by thirteen others, there can (I apprehend) be no doubt entertained as to the dangerous character of the hydrus species, and of the powerful effects of their poison upon the human body. It may perhaps be presumed from the *entire* recovery of fifteen persons bitten to whom the proper remedies were administered, that it might not have proved fatal and that the poison was not so dangerous as that of many of our *Indian* land snakes: on this point I shall not venture to decide farther than to remark, that the symptoms detailed in Case 2d, followed as nearly after the bite, and were as alarming in their appearance as in the cases of those bitten by the cobra de capello; the most dangerous of our *Indian* snakes: this being so, there are no strong reasons for presuming that the results would not have been equally fatal, had the proper remedies not been promptly applied. My confidence in the volatile alkali as a powerful antidote when taken into the stomach had been long established, and in the concentrated and elegant form of the Eau-de-luce fully confirmed by the able detail of its effects, in his own case given in vol. 11, of the Asiatic Transactions by my friend Doctor M'RAE of *Chittagong*.

The application of the carbonate of ammonia and nitric acid to the wound stood recommended by its constant use amongst the natives in similar cases, and after stings of scorpions and other poisonous insects.

To explain why salt was offered to the person bitten, it is proper to add that an universal belief prevails amongst the natives of this part of *India*, that salt tastes sweet to those who are under the influence of a powerful animal poison, and that when this morbid taste ceases, that the danger is abated or entirely over, and the alkali medicine may be safely discontinued.

IX.

THE RUINS OF PRAMBANAN

IN JAVA,

By JOHN CRAWFURD, Esq.

I HAVE the pleasure to present the Asiatic Society with an account of the Hindu ruins of *Prambanan* on *Java*. A residence of several years in the vicinity of this place afforded me many opportunities of inspection and enquiry of which if I have availed my self with any skill, I may hope that my narrative may compensate by its accuracy for its deficiency in learning.

The principal ruins of *Prambanan*,* as the name is written and pronounced by the present inhabitants of the island, are situated about 10 *English* miles from *Gugyacarta*, the residence of the Sultan of *Java*, and about 90 from *Surecarta* the residence of the *Susuhunan*.

The high road which runs in a direction nearly east and west, between these places, passes through the ruins.

By far the greater part of the ruins are in the district of *Pajair* and the rest in the district of *Matavam* where it joins the former. The country about *Prambanan* is a portion of an extensive valley, laying between the mountains of *Rábabu* and *Máràpi* to the north, and an humbler range to the south called from its situation near the south

* As P. and B. are in most languages and particularly in those of the *Indian* Islands, mutually convertible into each other, and the middle B. seems inserted to obviate a hiatus. *Prambanan* probably means the place of *brahmins*, agreeable to the mode of forming such names in *Javanese*.

coast *Gunnsheidul* or the southern mountains. The most northerly of the ruins are not above two miles distant from the latter, and though many miles from the peak of *Márapi*, nearly on the base of that extensive mountain. From the more easterly of the ruins to the more westerly, the distance is three miles and a half, and from the ruins to the more southern range of hills to those farthest north not less than three miles, so that the whole of the remains may be estimated to occupy an area of ten or eleven square miles. Before offering any account of the temples I may shortly premise, that the whole of these buildings appear to me to have been dedicated to the religion of *Buddha*, blended with the worship of SIWA, of the *Linga* and *Yoni*. This will render intelligible some remarks on the temples which it will be convenient to intersperse with the description of them.

A FEW of the ruins consist of single temples, but the greater number of groups on a square figure composed of one or more rows of smaller temples surrounding one or more great temples. The first of these groups that strikes the eye of a traveller is one lying within a few yards of the high way, and immediately to the north of the village of *Prambanan*. Here a confused mass of blocks of hewn stone, rubbish, rank vegetation, and rude mounds presents itself. Tracing the remains of the wall, which surrounds this group, I found that the area occupied by it was a square of about 500 *English* feet to a side. Running parallel with the remains of the wall are those of two rows of small temples at a few paces distant from each other. Most of these temples are nearly levelled with the ground, and none of them are perfect. They may be estimated to have been, when complete, about 20 feet high: each seems to have contained a single image, the pedestals of which are still remaining in several. This image I conjecture to have been BUDDHA, from discovering it in parallel situations in

similar groups, and from the existence in the vicinity of a single mutilated statue suiting the pedestals in the temples. In the centre of the square now described are three temples lying parallel to each other, in the direction north and south, and much larger than the exterior ones. The one occupying the immediate centre, is conspicuous by its decorations and ancient. The contents of this great temple which has four entrances and as many fanes, appear to identify the whole group of buildings with the worship of *Mahadéva*. The northern fane contains an image of his *Sakti* in the character of DURGA punishing MAHESASURA, the western an image of GANÉSA, their first born, and the southern an alto relief figure of the GOD himself, in the character of a devotee. The eastern fane is so thoroughly blocked up with stones, that there is no access to it, nor is it known what figure it contains. Judging however from the other images, and from similar buildings on other parts of the island, I would hazard a conjecture, that the BULL NANDI the *Vahan* of the GOD, is the image contained in this inaccessible portion of the temple.

GANÉSA and DURGA, but more particularly the latter, are still objects of veneration with the inhabitants of *Java*. In the ancient books of the *Javanese* both are designated by their proper *Indian* names, but the vulgar denominate the former *Lingan* or the elephant *God*, and the latter *Bokk Loro Jongran*, or "the virgin lady, tall and thin." Barren women, men unfortunate in trade, or at play, persons in debt, and sick persons continue to this day to propitiate the goddess DURGA with offerings, and I have seldom visited *Prambanan*, that I did not find her statue smeared with perfumed unguents or decked with flowers. The superstitious veneration of the *Javanese*, for the relics of their ancient worship, I discovered in one of my last visits to this place, was not

confined to the lower orders of the people, for His Highness the Sultan about a year ago when meditating, ambitious schemes of no common danger, made offerings to this same image of Durga, [illegible] however, more particularly induced to propitiate a *Hindu* divinity on this occasion from the nature of the connection he has been [illegible] known to have formed.

In a northerly direction from this group, and about half [illegible] distant from it, is the numerous group called (*) *Chandi Sewu*, or the thousand temples, so denominated, not from their precise number, but in compliance with an idiom of the *Javanese* language which applies this numeral in a loose way to any large assemblage of objects crouded together, of which there is another example in the southern range of mountains opposite, which in one situation take from their appearance the name of *Gunnun Sewu* or thousand hills.

The group of *Chandi Sewu* is a square building of a similar character with the last, but in some respects in a much better state of preservation. The northern and southern sides of the square measure 500 *English* feet, and the eastern and western 550.

This large group consists of four rows of small pyramidal buildings, having one great temple in the centre. The actual number of the temples is no less than 213; the outer row containing 78 the second 66, the third which is separated by a considerable interval from the two first 44, and the fourth 28. Between this last and the great central temple, there are the remains of a wide trench. The great central temple, which is probably not less than 100 feet high, has been despoiled of

(*) *Chandi* means a spire, not a temple for which the word is *Sangar*, but the former is in modern language always applied to *Hindu* ruins.

all its images, and in one only of the 212 smaller temples, is there a figure remaining. This solitary figure is a fine statue of BUDDHA, sitting crosslegged in the usual manner and thus measuring 3½ feet high and 4½ round the waist, excluding the arms. Close by some of the other small temples a number of mutilated figures of BUDDHA are still found, the pedestals corresponding to which still exist, in the temple themselves, and I have little doubt, but the whole of the smaller temples were shrines of BUDDHA. Most of these were occupied seemingly by one image only, but others as may be suspected from the niches in the walls contained one or more small figures, besides the greater one in the body of the temple.

The principal objects of worship were certainly in the great temple, and from the analogy of the other buildings, I have little doubt, but SIVA DEVA or his consort, and progeny in one character or another are the chief objects of worship.

The shape of the smaller temples is peculiarly worthy of observation. From the foundation to the lintels of the doors, they are of a square form, thereafter assume a pyramidal, but round shape, and are here decorated around, by small figures resembling *Lingas*, while a larger *Linga* surmounts the whole building forming the apex of the temple. This structure was tolerably perfect in one or two of the temples only, but the materials of a similar architecture, might in general be traced in the ruins of the rest. This indeed in a few words may be reckoned a description of the exterior of all the temples of *Brambanan*.

The group of the thousand temples like all the others was sur-

rounded by a wall, the vestiges of which may still be traced. To the grand square there are four distinct gates or entrances, one on each side of the square, and facing the cardinal points of the compass. At each of these entrances are two gigantic statues, seemingly in the characters of warders. These are in the posture of kneeling on one knee, and in this attitude are in heighth, exclusive of the pedestals, which are a foot and a half high, seven feet and eight inches, and measure round the body including the arms 11 feet. The *Javanese* term all those figures, which are frequent throughout the Island, *Gopála*, and I had hence at first imagined them to be representations of CRISHNA, of whom this is one of the titles, but their occupations the absence of a crown or umbrella, or other mark of royalty, render the conjecture inadmissible, and the perpetual presence of the snake is more probably intended to characterise the religion of *Siva*.

QUITTING the "thousand temples" and returning again in a southerly direction we meet a single unconnected temple which the *Javanese* call, for I know not what reason, *Candi Asak*, or the temple of the dog. It is a shapeless ruin displaying nothing remarkable, the top is open and displays to the observer the inside of the building, destitute of image or sculptures: proceeding still farther in the same direction, but not in all above 300 yards from the "thousand temples", we come to a small group, which contains about 25 temples including one large central one. These are of the same pyramidal form, and differ only, in being less ornamented with sculptures. The entrance into this is by a single gate to the eastern side, guarded by two warders of the same character with those already described, but of inferior size. All the temples of this group have been pillaged of their images, but a single mutilated figure of BUDDHA, close by, seemed to indicate what the contents of the smaller temples had been.

The central temple has no less than nine empty niches of various sizes, and in the middle right of the building was probably a figure in high relief, on a large block of black stone, found lying near the entrance of the temple. I am at a loss to point out what *Indian* divinity it tends to be represented by it as the usual emblems of the *Hindu* Gods are not discoverable on it. About a mile and a half to the eastward of the thousand temples and close to the village of *Plaosan*, from which they take their modern name, I discovered in the month of April last, several groups of temples which had hitherto escaped the observation of our countrymen in *Java*, and indeed I believe of all *Europeans*. The natives display a venture apathy on all subjects of this nature and the discovery of these ruins on the present occasion was purely accidental. The more northern group of the temples of *Plaosan* is an oblong square measuring 300 feet on the east and west sides, and 400 to the north and south. The smaller temples have been all levelled to the ground in this square, and in entering it, one perceives in their room a mass of ruins, and rubbish appearing here and there, above the long rank grass. The square appears originally to have contained three distinct sets of temples, each having a large centrical one, surrounded by a row of smaller ones. The middle and more southerly of the central temples, are still partly standing, though in a state of ruin. The middle temple contains two fanes, one of which however, is blocked up with masses of stone and inaccessible. The other contains on the same platform or shelf, two fine male statues in a sitting posture, sized by stone and from the similarity of the features, and whole character, evidently intended to represent the same divinity, which from the crescent behind one of them, may be pronounced to be Mahadeva.

[illegible] the next southern niche the two faces are still [illegible] con-tain a pair of figures, much defaced [illegible] though destitute of any of the more usual emblems [illegible] the *Hindu* divinities. I have little doubt however, but they are representations of *Siva* to whom it is probable the whole group is dedicated.

The interior of these two temples differs in a remarkable degree from all those which I have examined in other situations by the richness and profusion of the decorations. The principal figures are those of persons of rank in an attitude of devotion. Some are sitting and others standing, but all addressing their devotions to the images before described. The greater number are accompanied by figures of slaves or servants holding umbrellas. The smaller temples as already mentioned, are all in complete ruin, but the images which they contained, still exist, and several of them are nearly perfect, all those surrounding the two central temples already described, are images of Boodh in a sitting posture, the right side of the bosom bare, the hands variously disposed, sometimes resting on the knees, sometimes as if demonstrating or offering instruction, the features are elevated, the expression of the countenance placid, the hair short and curled, less resembling nature than the effect of art, and in my judgment having no likeness to the woolly hair of the *African*, no more than the features, to the flat nose, thick lips and other characteristic marks of the negro countenance.

The group of temples in the northern extremity of the great inclosure is in the same state of dilapidation, including the central temple, yet it is remarkable that most of the figures still remain, and many of them are entire, a fact, which seems to prove that religious [illegible] had little share in the destruction of these temples. Among the images

remaining in this particular part of the building, the most numerous are [illegible] and there are at least ten possessive of the [illegible] coming, images of which both in brass and stone, are exceedingly frequent on *Java*, but I cannot take upon me to specify the name or identity it with any of the Gods of *Hindu* mythology.

To the present group of buildings there are two entrances, [illegible] a western side, and each guarded by a pair of the gigantic warriors already described. About midway between the gates I discovered a slab of black stone with an inscription in the *Deva Nagari* character, much effaced and I fear illegible, except in one or two places. The stone is at least [illegible] foot thick, and as it bears no mark of the application of blows it seems somewhat difficult to account for its being broken in [illegible], unless we suppose that it was placed in an elevated situation and fractured in its fall. The temples of this group like the rest seem to have been surmounted by a figure like the *Linga*, and several mutilated ones, were discovered among the ruins.

Quitting this inner group, and proceeding in a southerly direction about 150 yards, we meet with another group called *Chandi Caput* or the seraglio, by the modern *Javanese*, from its containing few or no images only.(*) There is nothing of the history of these temples to be gathered from the modern names imposed upon them, which [illegible] some supposed side of the building, with a while fear reference to their [illegible] domestic habits, wholly foreign to the real object of such structures. The group of fifteen temples already mentioned is for example denoted *Lumbung* or the granary from its supposed relation to the [illegible] the Thousand temples near it, and there is a small temple [illegible] re-

(*) [illegible] according to the form of *Ganesa* [illegible] from [illegible]

number in the vicinity of the great temple of *Boro Budor* in the district of *Kedu*, which is termed from a supposed whimsical relation to the *Dapur* or the kitchen. *Chandi Cepuriyen* is an oblong facade, the north and south faces of which measure 200 feet, and the east and west 200. In this group there is no temple standing, but the foundation of each is distinctly visible, and the enumeration of the whole proves that they amounted to 92, appearing to have been all of equal size, for this group is remarkable for containing no great central temple and no statue of Buddha: each temple seems to have contained a single statue of a female deity which I can only conjecture represents the mild form of the consort of Siva.

The site of the temples of *Prambanan* is abundantly supplied with fine water, so much desired by the *Hindus*, and so necessary to the performance of their rites. Before two rivers of the purest water there is between the villages of *Prambanan* and *Plosan* a small tank, evidently an appendage of the temples. This little piece of water, is a square of about 200 feet to a side. The ground around it is elevated, and there is every appearance of its being an artificial excavation. The whole tank is covered with the blue *Lotus*, the flower of which is so conspicuous an ornament of the sculptures on the temples.

The *Lotus* though a native of *Java*, is generally propagated in the district of *Kedu* by art, after which it perpetuates itself, so that we may have a conjecture, that the plants which now cover this little lake of water are from the original stock planted by the first founders of the temples. (*)

(*) The Javanese language with its usual copiousness has no less than 10 names, indigenous or foreign for the *Lotus*, among which may be enumerated the following, viz. *Teratai*, *Padma*, *Kanwala*, *Tirta*, *Sarojadi* and *Ganeyora*.

The utmost limits of the ruins of *Prambanan* to the eastward, are about two miles from the village of *Prambanan*, and here in the midst of the rice fields the site of an ancient temple is marked by a few scattered bricks, which constituted a part of the foundation, but more distinctly by two large and two small figures of the usual warders. These relics are all that remain of this portion of the temples, and from them it may be safely inferred, that this was a group similar in character to those already described.

Proceeding from these in a south west direction, we come to the village of *Cabon Dalam* (*), which is not above half a mile distant from that of *Prambanan*, and close to the foot of the southern range of mountains, near to the village of *Cabon Dalam* are the ruins of a group of temples, not apparently differing essentially from the others.

The central temple alone is standing, all the smaller ones being in ruins, and the materials employed in the construction of the rude dykes and enclosures of the neighbouring peasantry. The temple has been plundered of its images whatever they were, and nothing remains to determine to what deity the building was consecrated. The entrance to the group is by the western side, where there are two warders, similar to those already described, one of them broken and sunk in the ground. It was at this temple that my respected friend Colonel Mackenzie, discovered a slab of dark coloured stone with a *Deva Nagari* inscription, similar in appearance to that which I found at *Plaosan*, but with the inscription far more perfect.

Not far from these buildings I found myself about four years ago, a block of the black stone, which is the usual material of the buildings,

* The Hindu Gauda

on which was an inscription in the ancient *Javanese* writing, which has not found character differing entirely in appearance from the *Deva Nagari*, though both alphabets are formed on the same principle. This block of stone from the manner in which it was taken out, and evidently modified a part of the materials of the adjacent temples, may here remark as a fact, not foreign to the history of the temples, that *Prambanan* is the only place on *Java* where any inscription in the *Deva Nagari* is found, whereas inscriptions in the ancient *Javanese* character are frequently met with in many parts of the island. The discovery of both in the same situation is also a fact worth attending to, and may be adduced in proof of the hypothesis, to be afterwards mentioned in discussing the history of the temples.

In a westerly direction from the village of *Cabon Dolam*, and just behind that of *Prambanan* we discover very extensive ruins, but no temples standing, these ruins extend to the west as far as the banks of the *Umpah* (*) a clear and rapid stream which runs in a south-west course, till it empties itself into the sea nearly opposite to *Guggeorta*. To the south the ruins extend nearly to the bottom of the range of hills. This ground is alledged by the natives to have been the site of a town or city and certainly has that appearance. Here the walls of a great square enclosure are still to be traced, particularly to the north and west sides. By measuring these, they are discovered to have been 900 feet to a side. The appearance of the square, is that of a place of *Graton*, and tradition states, that it contained the King's palace, but of this there is no vestige; towards the eastern side of the enclosure are however to be found a number of images of a very interesting and determinate character. The ruins of the temples in which these were contained, form at *Cabon Dolam*, the materials of the rude cabins

* *Umpah*, means pillar or stand, possibly from its having the foundations of some of the temples and other buildings.

which separate the neighbouring fields and gardens. Among the most remarkable of the figures here discovered, may be mentioned a representation of *Surya*, with his seven headed horse; the driver *Aruna* does not appear, the figures being more commonly represented. A figure of *Mahadeva* (*) more distinctly marked than usual with images of this God is *Jata*, a skull in his crown, the *Pasa* in one of his four hands, and a crescent at the back of the image. Another figure of the same God, four handed and not less distinctly marked by the known attributes, of the deity, for behind the image there is a crescent, and in its hand a garland of skulls: several figures of *Ganesa*, one of them displayed by the God, shaded by a hooded snake, the only instance I can recollect on the island of this image so characterized; and here are also several ordinary figures of BUDDHA. But the most remarkable relics in this place, are three erect but mutilated statues of a male divinity, which I have no where else observed. Each is accompanied by its *Vahana*. The first having the *Bull Nandi*, is no doubt *Siva*, and I should have as little doubt, but the other two, whose *Vahanas* [illegible] are *Vishnu*, but also to all these are as many corresponding *Yonis*, which on being [illegible] recovered to fit the lower parts of the images, which therefore there is no doubt, were the corresponding *Lingas*. Notwithstanding the appearance of *Garuda*, therefore it seems pretty certain, that the temples of this portion of the ruins also were like the rest, dedicated to the worship of *Mahadeva*, of the *Linga* and *Yoni*, mixed with the worship of BUDDHA.

Adjoining the range of southerly hills so frequently mentioned, and in a direction nearly due south from the relics just described, we find an elevation a few hundred yards from the rugged bank of the hills, the [illegible] terrace by the *Pasanggrahan*, the *Craton* or royal residence of

(*) Author Mr. [illegible] on the Gods, [illegible] to my knowledge found in *Java*, [illegible] and are in [illegible] which [illegible] they so frequently are represented in India.

Beside (*) The real figure of this ruin, which appears from the accounts of the vegetation under common circumstances, must be inscrutable confusion, was distinctly ascertained by burning and destroying the grass and trees. It proved to be a square terrace of a fine of hewn blocks of hewn stone, measuring 68 feet to a side, and being four feet high. This terrace is surrounded at the distance of 14 feet by a wall ascertained from a small portion of it yet nearly perfect, to have been 11 feet high. In this there are four doors, which I found by the traveller's compass to face the cardinal points. I may here observe that as this appears to have been an object aimed at throughout the whole of the buildings, it would be a curious point to determine with what degree of precision the object has been attained, as from this, the skill of the artists and the nature of the instruments which they employed might be ascertained. On the top of the terrace in two situations are seen some loose blocks of stone which appear to have constituted the elevated foundation of the sheds, which the *Javanese* I believe, in imitation of the *Hindus*, term *Pandopa* or *Mandopa*, it is in these houses as these that the modern princes take their seat on public occasions, and to judge from this as well as from the extent and form of the terrace itself, to those of a modern palace called the *Alun Alun*, (*) I have no hesitation in assuming to the common tradition of the present day was really a palace. Dr. Tytler, who accompanied me in one of my last excursions to *Prambanan*, discovered in the large stone pillars of stone on the terrace, a fragment of a slab of stone on which was a *Deva Nagari* inscription, and a little way to the south of the buildings a mutilated stone figure which I imagine to represent *Durga* destroying *Tripurasura*. The inscription, the image, the nature of the materials and the character of the architecture, seem amply to identify these buildings with the ruins on the plain.

(*) *Ca* is a derivative from *Para*, a king or sovereign prince.

(*) *Alun Alun* is a level ground or lawn.

[illegible] we [illegible]ned pa[illegible] and proceed[illegible] about [illegible] miles on [illegible], we discovered two artificial excavations in the rocks, the largest of which is [illegible] long, [illegible] broad, having benches towards the back [illegible] to sleep or recline on; they are not above three feet high; between the caves is a small tank about 6 feet deep like the caves cut in the rocks. I have no doubt that these excavations were instituted by the order of holy devotees, who sought a reputation by the performance of these austerities believed to be efficacious according to the religious system of the *Hindus*. After leaving the caves and going eastward about two miles as far as I could conjecture, amidst the mazes of a difficult forest, we came to a solitary temple or rather the ruins of one. This the *Javanese* call *Chandi Baron* a term of which I never could obtain a satisfactory explanation. From the nature of the materials, and judging from the little that yet remains standing of the fabric itself, we may plainly discern that this temple is of the same character, with those of the plain. Since I visited it, I have been told that a *Ganesa* has been dug up from the ruins. Such a situation as that occupied by the ruins now described, is one that never would be chosen by the present race of inhabitants, whose interests confine them to the plain, and all the modern seats of *Javanese* government are in the lower situations. The builders of *Prambanan* must therefore have been actuated by different motives, and these motives are discovered by a reference to the *Indian* precept, which directs a *Hindu* prince to choose the fastnesses of the mountains for the seat of his government.

RAJA BAKA stated by tradition to be the builder of *Prambanan* is wholly unknown in the histories of *Java*, but by name, and by the single circumstance of his being stated to have been defeated by a *Javanese* prince of the name of BANDOR.

[illegible] are the whole of the ruins [illegible] in the [illegible] of [illegible]. The river *Uapan* divides this last district from *Matarem* [illegible] on the western bank is the village of *Bogan* [illegible] to the [illegible] where [illegible] be seen four gigantic statues differing from any [illegible] mentioned.

The following is a brief description of these [illegible]. The statue is sitting cross-legged, and rises measures six feet high, and seven feet three inches across the breast including the arms. The figure has an elevated crown, the sacerdotal cords, armlets, and a breast piece in the usual manner, but it [illegible] I can ascertain any distinguishing attribute of an *Indian* divinity. These figures are in a superior style of sculpture. In the village of *Bogan* I found a well sculptured [illegible] which was used by the peasants as a block for husking rice.

As the traveller passes on to the town of *Ayugyarta*, the road is crossed about three quarters of a mile from *Prambanan* by a second stream called *Cali Manin*, or the clear river, an epithet so universally applicable to all the rivers in the interior of *Java*, that it is not easy to guess why it should be particularly applied to one. Not far from the western bank of this little stream, and within a dozen yards of the south side of the high road, there is a single temple which like all those described takes its name from the river near it. This is upon the whole the most highly finished, the most perfect, and in some respects the most interesting of the ruins of *Prambanan*, and therefore I shall be more particular in my description of it. The temple is of a pyramidal shape, and differs chiefly in its greater size and the superior style of the decorations from the other temples.

The whole building rests upon an artificial and elevated foundation, which judging from similar ones that have been traced, is probably [illegible]

Brick, on this foundation there is a terrace of hewn stone, five and a half feet high. The second part of the building is reduced to a shapeless mass, and the lower part only which is about 40 feet, remains. This consists of two great faces to the east and west, and two small chambers to the north and south.

The exterior of these compartments measures, the east and west, each 48 *English* feet wide, and the north and south, each 26 feet. Lying between these four faces of the building, are four angular double faced projections facing the intermediate points of the compass, thus giving to the whole building 12 faces of various dimensions.

The entrance to the principal one is to the east, by a flight of seven steps to the terrace from which you enter the body of the temple through a porch: directly fronting you, there is the remains of what has the appearance of a handsome altar piece, over which there is a niche, which seems to have been occupied by the chief object of worship when the temple was entire: within the porch, and on each side as you enter there are two niches for full length figures, but every image has been removed from the interior of the temple. The western side differs from the eastern in the smaller size of the chamber, to which there is no access by a porch, and it is in a state of much dilapidation. The entrance into the northern and southern chambers is through a mean door, and directly by a flight of steps of the same hewn stone as the rest of the building. These are dark prison like apartments, and have by a minute aperture a communication with the great eastern face. They had each contained an image, the pedestals of which are still standing. In various parts of the outside of the building, no less than 12 great niches may be counted. At the entablature and cornice, which terminate the square shaped portion of the

building numberless. Smaller niches are to be seen all round the upper part of the building, in two of which we discover the image of Buddha in a sitting posture still remaining, and mutilated figures and fragments of others were found scattered through the ruins round the temple so that the whole of the empty niches of the upper part of the building were in all likelihood similarly occupied.

IMMEDIATELY above the figures of BUDDHA where the temple begins to assume a conical shape, several figures, apparently of the *Linga*, are still standing, and a great many more both whole and mutilated are found scattered among the ruins. On inspecting the exterior of the temple, we discover the eastern and southern sides, the latter in particular, in a much superior state of preservation to the northern and western, which is readily accounted for, when we advert to the circumstance of the latter being exposed without protection to the winds and rains of the western season, while the former are protected by the range of hills, even from the milder influence of the eastern season. In the easterly and southerly sides of the building, the structure is indeed in a state of freshness, not to be seen throughout any other part of the ruins of *Prambanan*, displaying to great advantage its minuteness, and I may add the perfection of the workmanship. Here is to be first discovered, what has long ago been effaced in the rest of the temples, the fine coating of mortar which covered the buildings, and gave the last finish to the labours of the artist. The plaster is about the eighth part of an inch thick, and adheres to the smooth stone with wonderful tenacity, a satisfactory proof of the excellence of the composition, and the skill of the builder. Nothing can be more different than the mortar at present in use, which is both ill-concocted and unskilfully applied, yet notwithstanding the excellence of the former, when we consider the manner and situation in which it is applied, that it has disappeared where exposed to the inclemency of the weather, and been

preserved only under favourable circumstances. I shall look upon this as one proof in favor of the opinion to be afterwards offered, that the temples of *Brambanan* are not of a very remote antiquity, but rather comparatively modern structures.

A few hundred yards to the west of the temples now described are the remains of a group similar in character to all those already described. The mere foundations however, only remain, and even these have been very recently disturbed for the few bricks they contained, and which were to be traced in the piers of the bridge close by. The pedestals of a number of very large statues are still among the ruins, and four huge warders have by their size escaped the general destruction. These it may be remarked appear as double sentinels to one entrance on the south side of the ruin.

We see indeed from a retrospect of the situation of the warders, throughout the ruins, that there is no one established mode of disposing of them, and that the entrance to the temples may be towards any one, or all four of the cardinal points of the compass. Here the entrance is to the south, at *Plaosan* there are two entrances to the west, in the farthest east of the temples the approach is to the east, and at the "thousand temples" there is one at each of the four quarters. Nearly opposite to these ruins and to the north side of the Biga road is a temple differing entirely in shape from all the rest, but from the character of the architecture, and the nature of the sculptures and decorations, evidently connected with the same religious worship, and constructed by the same people as all the others. It has something of the appearance of a long barn, and consists of two stories with an [illegible] roof. Within it is divided into three chambers, the largest in the centre, and thus communicating with the two smaller ones at the ends through the regular sets of corresponding apertures in the opposite walls

there is no doubt, but the building when complete had an upper floor, and we may conjecture from the absence of stone beams, or any remains fragments of them, that this portion of the building was of wood.

In the walls in all directions there are many niches, no doubt as in the other ruins intended for the reception of images, from which circumstance, as well as the costly and luxuriant decorations on the exterior walls, there can be little hesitation in concluding that this building was a place of religious worship, and not as some have conjectured a dwelling house.

There is as already mentioned a profusion of fine work on the exterior walls, which as in the other buildings, consist of full length figures male and female in relief, flowers and other ornaments, of which it is unnecessary now to offer any account as they will be included in the general description of the prevailing decorations of the temples to be afterwards given. Such is a brief document of the principal remains at *Prambanan*: the extensive and fertile valley in which they lie, contains a number of inferior relics connected with the same worship, which it would be too tedious to enumerate, and I have therefore circumscribed my subject within the narrowest limits.

This particular part of the island has justly been a favourite seat of *Hindoism*, and among the modern names of places we can still trace, as in many other parts of the island, the classic names of *Indian* story. I shall give but one example. The town which the *Dutch* have corrupted into *Dyoyocarta* is the Indian *Ayodya*, the country of RAMA CHANDRA the place before it became in the year 1765, the residence of the successful rebel MANCU BUMI, was called *Ayugya* (a corruption of *Ayodya* originating in the peculiar enunciation of the *Javanese*) which he changed into the compound *Ayugyacarta*, written from the imperfection of the

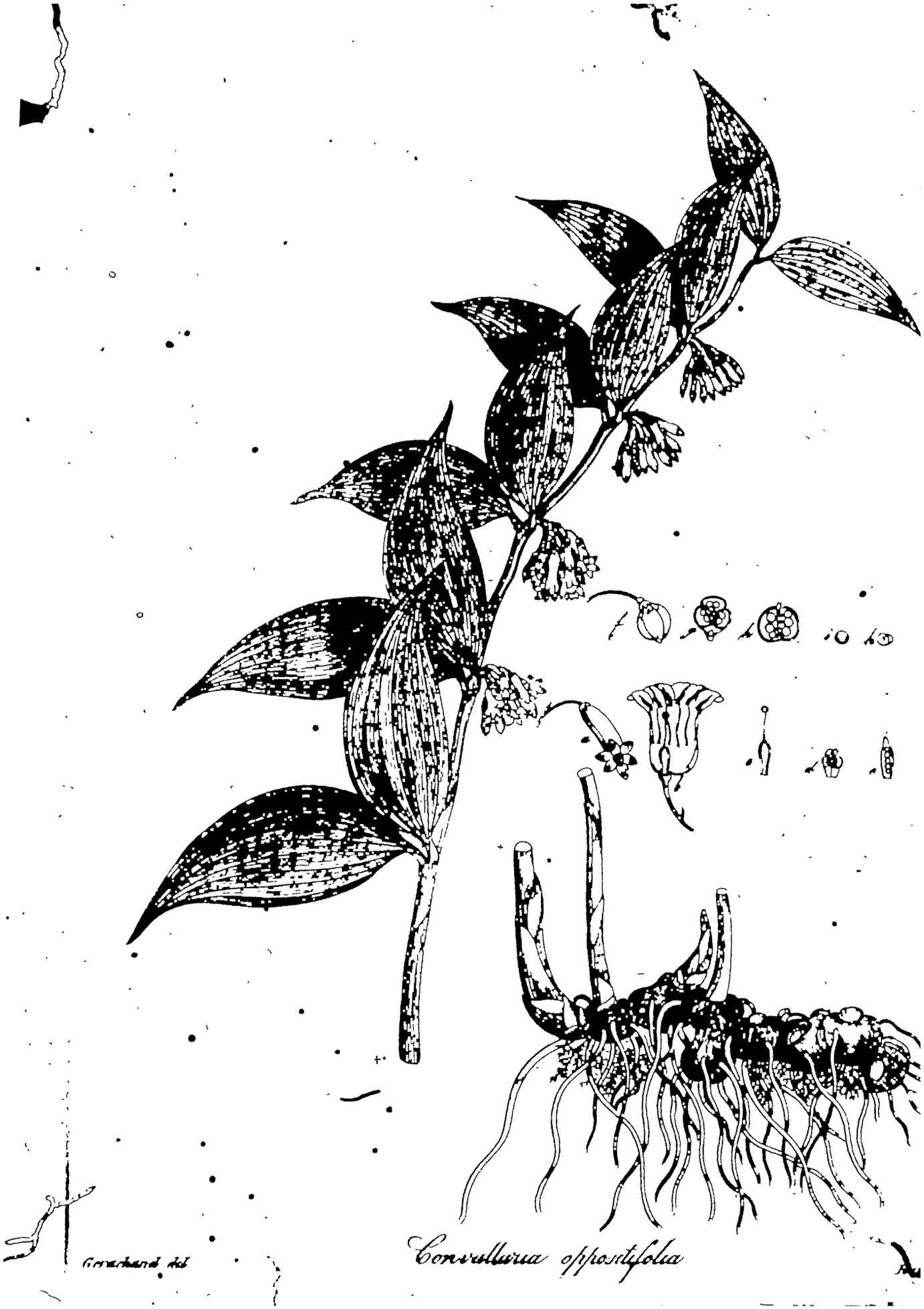
modern dialect which drops initial vowels [illegible] to trace the corruptions which words are [illegible] to undergo. The Sanskrit word *Ayudya* becomes in *English* Oude, in *Javanese Nayogya*, and in *Batavian* still more barbarously *Djoya*. The temples of *Prambanan* are built of a hard dark and heavy species of basalt called by mineralogists trap. This Lava, called by Doctor Horsburgh is the chief component part of the mountains of *Java*. In the foundations and coarser parts of the buildings an inferior material, a kind of white soft land [illegible] in various degrees of aggregation is to be found. The black hard stone is usually hewn in square blocks of various sizes. The respective surface of the stones which lie on each other in the building, have grooves and projections adapted to each other; they are regularly arranged in the building in such a manner as to ensure the greatest strength and solidity to the structure, and no mortar is any where had recourse to as a cement. With materials of such excellence the construction of the temples of *Prambanan*, cannot be contemplated as a task of very extraordinary difficulty, for there is neither boldness nor grandeur in the design. There is nothing here upon a great scale, nothing but what seems within the reach of the most obvious mechanical contrivance, the most ordinary efforts of common ingenuity. What we are chiefly struck with is the minute laboriousness of the execution. Its success is also calculated to excite our admiration, though no doubt the effect is hightened by the comparison which we are apt to make between these ruins, and the rude effects of the modern art of the *Javanese* by which we are surrounded.

Upon the whole there is neither grandeur nor sublimity in the temples of *Prambanan*. The want of pillars conveys a disagreeable impression of nearness and inelegance; the buildings are themselves too

called so, it is [illegible] on all the most correct [illegible] as temples [illegible] small, the entrances [illegible] and the interior conveys [illegible] of the gloom of a vault or prison, than of the awe which ought to attend [illegible] place of worship. For the place they are in, they are [illegible] wonderful structures, but one must be a *Hindu* to view them with [illegible] like enthusiasm. The sculptures and decorations of the temples are [illegible] less, but some are so predominant and characteristic as to deserve particular notice; one remark respecting all of them may be premised, that they must have been executed after the erection of the [illegible] only obvious and practicable means, indeed, of delineating figures and groups of such extent on a variety of different stones. The first part the sculptures of the temples, which I shall mention are the human figures, which are so often delineated in relief on the walls. These are sometimes male and sometimes female, and are executed with considerable skill, the artist often succeeding in conveying to the figures even a portion of ease and grace. These sculptures are I think universally destitute of the characteristic emblems of the *Hindu* Gods. They are as invariably without armour of any kind. Neither their countenances nor attitudes portray any remarkable activity of mind or body. Their mild but passive forms not destitute of some grace would seem rather emblematical of that benevolence and tender heartedness so vaunted in the doctrines of BUDDHA, but of which so little is discoverable in the conduct of the modern followers of this worship, if we form our conclusions from the character of the people of *Ava* and *Siam* or of the inhabitants of *Ceylon*, all of them probably the most remarkable for cruelty of any people of *Asia*. The [illegible] decoration of the temples which I shall mention is a monstrous face without a lower jaw, found in the most conspicuous part of the temples, particularly over the key stones of the arches and towards the [illegible] projections of the buildings. The same ornament if indeed it can be

a
b
c
d

Andromeda ovalifolia


Gerardand del
Convolvulus oppositifolia

Gaultheria fragrantissima

called Io, is to be discovered on all the most perfect *Hindu* temples on the island, and is particularly frequent on the great temple at *Boro Bedon*. It is remarkable that the prostrate idols of *Durga*, particularly those of the eastern end of the island where *Hindu* is known to have flourished most, before its extinction, wear this monstrous face on their chests. It is still more frequent with the *Hindus* of *Bali* and *Lombok*, who are worshippers of SIVA: it is generally a moveable piece of gold fixed to the upper part of the scabbard on which the figure is embossed, and which differs in no manner from those delineated on the temples. The ambassadors of the Raja of *Lombok* informed me, that the face was a representation of SIVA. I may remark, that I found it delineated on one of the finest figures of the *Yoni* at *Prambanan*, and its being discovered in a situation so decidedly identified with the worship of MAHADEVA, may be adduced in confirmation of the opinion that it is intended to represent this God.

THE most frequent ornament on the buildings is the *Lotos*. It is indeed almost universal on all the *Hindu* relics on the island. The ordinary figures on the outer side of the walls of the temples are never without a plant of it, and even the deities themselves, of all descriptions are generally sculptured with it. In the statues whether of brass or stone, found throughout the island, the pedestal very usually consists of the expanded calix of a *Lotos*, and the female figures in particular are perpetually attended by it. I suppose the *Lotos* to be here an emblem of PARWATI who as well as SRI I find, has the epithet of PADMI in the nomenclature of the gods. This I infer however, only from the supposition already so often made of their temples being peculiarly dedicated to the worship of SIVA. This may probably be considered as in some degree corroborated by the circumstance of the calix of a *Lotos*, being frequently substituted for the *Yoni*.

small figures in basso relievo, representing the *Chakra* and *Lotos*, the usual attributes of Vishnu, which I should have concluded to have been designed for Vishnu himself, but as his *Avatars* are so seldom met with, and as I have I think never seen the *Chakra* accompanying any image whatever, I rather consider figures so decorated, as forms of the consort of Siva. The prevalence of vegetable decorations throughout the temples of *Prambanan*, does not but attract notice. This I think may be fairly ascribed to the principles of the followers of Buddha, who profess to abhor the spilling of blood. It would be endless to recount the varieties of these, the greater number however, seem rather the productions of imagination, than of nature.

The outer sides of the walls consist usually of large compartments, sub-divided by sculptured pilasters: these are generally surrounded by borders of flowers, or fanciful ornaments, while the interior is occupied by figures of trees and plants, of animals, or of both. A bird of the parrot kind appearing in the folds of a festoon of flowers, is a very common border, both in the ruins of *Prambanan*, and *Boro Bodor*.

Animals are not frequent on the ruins of *Prambanan*, but they do occur sometimes: the most usual are the lion, and the elephant, animals that are not natives of *Java*. It may be offered indeed as a general remark, that the animals and plants, as well as the human figures delineated, are all of them foreign to the Islands. Groups of historical representations, which abound so much at *Boro Bodor*, are seldom to be seen at *Prambanan*. I can state but one exception, which is a representation of the warlike apes of Ráma, upon some large stones which cannot at present be restored to the temples to which they originally belonged.

THROUGHOUT the whole of the buildings, there is one general observation, which may be made upon them, viz. that they are distinguished by a commendable decency, and among the great variety of representations which is found I should be at a loss to point out a single object that could give offence to the most fastidious delicacy. This is the more remarkable, when we advert to the nature of the religion to which these temples are dedicated, and contrast them in this respect with the gross indecencies, which so frequently disgrace the temples of *Hindustan*. After this sketch of the temples and their decorations, I shall make a few observations on their æra, on the nature of the agency by which they have been brought to their present state of dilapidation, on the nature and character of the worship, to which they appear to have been dedicated, and lastly offer some conjectures respecting the founders of these remarkable structures.

I have already hinted that the temples of *Prambanan*, are not of a very remote antiquity, and accordingly in the memorial verses, as SIR WILLIAM JONES, calls them, in which the chronology of the *Javanese*, as well as of the *Hindus* is preserved, the date of the oldest of the temples, those to the east of the river *Unpah*, goes no further back than 1108 of *Salivana* or *Saca*, as it is called in *Java* and *Bali*, and the other temples, those to the west of that river, are by thirty years, more modern. This traditional date, for it can hardly be considered as much better, is however corroborated, in a remarkable degree, by the approximation to it which is discovered in all the monuments situated in the same part of the island; none of these go farther back than the beginning of the 12th century of *Salivana*, and none of the real hindu temples which bear the marks of an Indian origin later than the middle of the 15th the whole reign of genuine *Hindu* princes, as well as can be ascertained from such dates, is confined

in the central districts, to a period of about 143 years. On a brass cast of BUDDHA, found not many miles from the ruins of *Prambanan*, there is I am told inscribed in the *Deva Nagri* character, the precise year, alleged to be that of the building of the oldest of the temples of *Prambanan*, or 1188: on two of the astronomical brass cups so frequently met with, and which were brought from the district of *Pachitan*, there are inscribed in plain figures in the ancient *Javanese* character the years of *Salivana* 1241 and 1246. The æra ascribed to the building of the temple of *Boro Bodor*, which is in a far higher state of preservation, than those of *Prambanan*, is 72 years more recent than the oldest of the latter. From all these facts, and the internal evidence afforded by the state of the ruins themselves, I conclude that the æra alleged for the building of the temples of *Prambanan* is not far from the truth or at all events, is exceedingly probable. It may here be remarked, that while the establishment of *Hinduism*, cannot be traced farther back than the beginning of the 12th century of *Salivana* in the centre of the island, there are several monuments in the eastern end which prove its existence there at least 400 years earlier.

THE dilapidation which is discoverable in the temples of *Prambanan*, is soon traced to its true causes, by a careful consideration of the buildings themselves, an attention to the physical circumstances of the country, and the character of the population. The chief cause of destruction, is I think, the luxuriance of vegetation peculiar to the climate. The solidity of the structure, however admirable, is little calculated to resist this species of depredation: the tendrils of a variety of creepers insinuate themselves into the minutest chinks of the buildings, and soon growing into trees of 8 and 10 inches in diameter, their destructive effects become quite irresistible, in structures neither protected by mortar, nor bound by bars of metal, which might have protracted their fall. The progress of this species of dilapidation, is dif-

coverable throughout the whole of the buildings.

The next most powerful causes of dilapidations, are the earthquakes, so frequent in these volcanic regions, under which may be comprised the concussions, from the active state of volcanos, the crater of one of which is not perhaps 15 miles in a direct line from the buildings, and the effects of the eruptions of which may be traced to within two or three miles of the temples themselves.

A third and effectual source of destruction is the removal of materials, for oeconomical purposes, and of the images, and sculptures from misplaced curiosity; of this source there are ample traces, not to mention that the neighbouring dykes, are chiefly composed of the stones, of the temples: in some places, a *stone* will be found as a rice mortar, and in others the *Linga*, buried in the ground to a sufficient length to afford a convenient seat: at the town of *Ayugyacarta* I discovered a great many images, and traced a large portion of them, to *Prambanan*, from whence some of them, had been brought within a few years only.

A fourth source of destruction, which I chiefly state on the authority of the natives, has been the search for hidden treasure: evidences indeed of the frequency of this practice, may be traced among the ruins, in the pits surrounded by excavated earth, stones, and rubbish, which are so often seen.

Among the causes of the dilapidation, of the temples of *Prambanan*, I have not included, though it may at first sight appear a probable one, the effects of the fanaticism of the early mahomedans: my chief reasons for believing that religious zeal, had little share in their destruction, are in the first place that no marks of wilful and malicious violence, are discoverable either in the temples of *Prambanan*, or any other on the island: many of the images, which would

naturally be the first objects of destruction with the zealots, are quite entire, and all of them, will be discovered to be in a state of preservation proportionate to that of the temples, in which they stand: when these have fallen in, the images will be found either crushed, mutilated or slightly injured in proportion to the weight of the incumbent materials.

In the second place, it is to be remarked, that judging from the respect, in which these temples are still held, we may infer the veneration with which they must have been considered at the period of the conversion, and that immediately subsequent to it, and hence conclude the improbability of any violence being offered to them: the conversion of the *Javanese* indeed was rather the effect of a sort of fashion, and of example, than conviction: after the discipline of near three centuries and a half they are still but luke warm mahomedans: prudential motives would therefore have actuated even the most fanatic of the earliest leaders of *Mahomedanism*, to respect the objects which were venerated by the people. From the facts handed down to us respecting the history of this conversion, we are indeed made acquainted with the extraordinary attention, paid by the early leaders, to the prejudices of their followers, for in many respects they rather blended *Islamism* with the ancient superstitions of the country, than established a thorough revolution in religion, a fact on which probably hinges the chief secret of their success.

I am inclined to consider the religion of the founders of *Prambanan*, as a genuine example, of the reformed worship, of Buddha. I venture to conjecture, that the religion of Buddha as practised on *Java*, was not the worship of any deified person of this name, but a reformation of the bloody rites of Siva and Durga brought about by certain sages or philosophers, who are represented by the images of Buddha.

MAHA-DEVA I have seen on one occasion (*.) sitting on a pile of human skulls and decked with a neck-lace of the same materials. At *Prambanan*, he appears once, as already mentioned executing vengeance on a tyrant, but by far the most frequent form, of this deity on *Java*, is that of a venerable and harmless devotee.

We may be convinced from a variety of facts, that the buildings of *Prambanan*, and all similar structures, are not the work of the natives of the country, but of foreigners and were we to draw any conclusion in favour of the general civilization of the people, from the perfection attained in these, we should argue erroneously. *Hinduism*, or at least the doctrines of BUDDHA, flourished on *Java* for a period of about 500 years, when the emigrations from India ceasing or becoming less frequent, the *Javanese*, were left to themselves, and the monuments, erected from this time, until the utter overthrow of *Hinduism*, a period of more than a century, evince the rude state of the arts among them, and sufficiently attest, that *Prambanan*, and all monuments of a similar nature, were not the work of the natives. The best examples of this degeneracy, are in the *Hindu* relics, discovered in the mountain of *Lawa*. These are evidently dedicated to the same worship as the others, but they are remarkably rude, and on the slightest inspection, are discovered to be the work of a very different race of people, from the older temples. On the buildings at *Sucuh*, to the northern side of the mountain, there are the dates 1361, and 1362, only 38 or 39 years, before the establishment of *Mahomedanism*, and a century posterior to the building of *Boro Bodor*, the last of the genuine *Hindu* temples. If farther proofs were required,

(*) One of six statues now at *Samarang*, and by far the finest on *Java*. They were brought from *Tawang-grum* (garden of perfumes) in the district of *Malang* towards the eastern end of the island. This is said to have been the principal place of worship of a race of kings, whose residence was at *Suhasari* in the same district. The six statues are, the figure of SIVA, already mentioned, a figure of DURGA punishing MAHISASURA, a statue of GANESA, one of NANDI and two gigantic male statues, one of them with a trident which I take to be also figures of MAHADEVA.

that the natives of *Java*, were not the builders of *Prambanan*, or similar structures, I would observe that in a period of 338 years, which has elapsed, since their conversion to *Mahomedanism*, during which they have been, in matters of this nature nearly left to themselves, they have not constructed a single building, that can be compared with even the rudest of the *Hindu* temples, and their mosques of the earliest and latest periods, are mean and paltry wooden fabrics, utterly unworthy of any notice.

The country of the founders of *Prambanan*, and of all others, who propagated *Hinduism* on *Java* is certainly the kingdom of *Telinga* on the peninsula of India or *Calin*, as it is universally written, and pronounced in *Java*, and every other country of the archipelago; this is the only country of India, known to the *Javanese*, by its proper name, the only one familiar to them, and the only one of which mention is made in their books. Hence they designate all India by this name, and know it by no other, except indeed, when by an excusable vanity, they would infer the equality of their island, with that great continent and speak of them relatively as the countries on this, or on that side of the water, common modes of expression. It may be farther stated, that *Javanese* tradition, invariably ascribes the introduction of *Hinduism*, to the natives of *Telinga*. The principal native intercourse between India, and *Java*, as well as the other islands, down to the present, is from the same countries. That the intercourse was at all events, with the countries on the eastern coast of the peninsula of India, may be inferred by the striking agreement between certain remains of the ancient institutions of *Java*, and those peculiar to the Indian countries in question. The most remarkable example is afforded in the calendar (*) the æra of *Salivaha*, which is that, which existed on *Java*, is in India, I believe nearly confined

(*) This renowned personage is unknown in the Indian islands by the name of *Salivana*, the

to the *Deccan*. The year in *Carnatic* and *Telinga*, was lunar with intercalations of one month in every thirty, and this was the ancient mode of reckoning also on *Java*, and is so still on *Bali*, as its name *Saca Warsa Chandra* distinctly implies.

It is still more remarkable with respect to the æra, to find the *Javanese*, and *Balinese*, agreeing precisely, with the more northern nations, of the *Deccan*, in reckoning the birth of *Salivana*; as it is known, that the latter differ by one year in their calculations from their southern neighbours.

In conclusion I shall add that the worship of Buddha, and of Siva, of the Linga, and Yoni, were if I am rightly informed the prevailing forms of religion in the *Deccan*, in the period when we suppose, the intercourse with *Java*, to have taken place: the former was persecuted and nearly superseded by the latter to which we may safely ascribe the downfal of the one on *Java*, as evinced by the striking decay of the arts which accompanied it and the triumph of the other on *Bali*, where as I have mentioned in a former essay it is now the prevailing form of *Hinduism*.

Ayugyacarta May 1st 1816.

N. B. I should be wanting in candour, did I not acknowledge, the great assistance, I have received, in the compilation of this paper from the valuable Essay of Colonel McKenzie, in the volume of the Transactions of the Batavian Society.

appellations by which I have heard him distinguished are *Sooe* or *Aje Sooe* pronounced *Aje Soco*, according to the peculiar enunciation of the *Javanese* meaning. "*King Sooe*" and *Dooee Warch*, a name equivalent to "offspring of the water" which is I believe, as well as the former, one of the titles, under which he is known in India.

Primula prolifera.

Dayelone commelina Lour.

X.

Descriptions of some rare Indian Plants, *by* N. Wallich. *Esq. Superintendent of the Botanic Garden, Calcutta.*

Read February 11, and June 3, 1818.

Hedyotis, stricta. *Wall.*

ERECTA asperula, ramis elongatis subdichotomis nudis, foliis linearibus, stipulis truncatis fimbriatis pedunculis terminalibus longissimis ternis subpaniculatis, stigmatibus linearibus.

Habitat in montibus Napaliæ, inque Turraye huic vicina; vigens Martio-Mayo.

Herba gracilis, tenuis, stricta, pedalis sesquipedalisque, *radice* perenni longâ fibrillosâ albâ.

Caulis obsoletè tetragonus, pubescens punctisque minutis elevatis scabriusculus. *Rami* oppositi subbrachiati, filiformes, erectiusculi, subcomplanati, semel bisve dichotomi.

Folia angustissima, glabra, pollicaria ad bipollicaria, internodiis longiora,

costâ subtus elevatâ, basi desinentia in stipulas brevissimas vaginantes crenulatas dum juniores denticulis aliquot subulatis notatas; superiora subulata.

Flores magni, extus purpurascentes, glabri, terni, cum solitario e dichotomiis, pedunculis elongatis gracillimis erectis instructi.

Calycis dentes lanceolati, erecti, acuti, basi tubi adpressi.

Corolla hypocrateriformis. *Tubus* gracilis, striatus, obsoletè tetragonus, semipollicaris, calyce multoties longior, apice leviter ampliatus. *Laciniæ* oblongæ, obtusiusculæ, patentes, tubi dimidium æquantes.

Antheræ lineares, longæ, erectæ, cum laciniis alternantes, fauce inclusæ, filamentis capillaribus brevissimis insidentes.

Ovarium oblongum glabrum biloculare, loculis polysporis ovulis septo utrinque incrassato insertis. *Stylus* brevis, glaber. *Stigmata* inclusa.

Capsula subglobosa, magnitudine piperis nigri, glabra; fusca, placentis carnosis, inferne septo utrinque adnatis.

Observation. This elegant plant which appears to me quite distinct from Hedyotis graminifolia, LINN. was first communicated to me by my esteemed friend Mr. WILLIAM LOCK, of the Honorable East India Company's medical service, to whose liberal and valuable botanical communications I am indebted for descriptions, drawings, and specimens of several interesting plants, from the former of which the preceeding account has almost entirely been taken. I had it afterwards from Napaul whence my people sent abundance of specimens to me, under the names of *Goshega Soah.*

I have retained the specific name given by Linneus to a species of *Oldenlandia* which has been ascertained not to differ from his *Hedyotis graminifolia*, and I have placed my plant under the last mentioned genus on the authority of the illustrious president of the Linnean Society (see *Hedyotis* in *Rees' New Cyclopædia*) and that of my predecessor in the botanic garden at Calcutta, the late Dr. WILLIAM ROXBURGH, who in a note to Oldenlandia, in his

MSs. Flora Asiatica points out the apparent identity of these two genera.

Androsace cordifolia. *Wall.*

Villosa, foliis ovato-cordatis obtusis sinuatis crenulatis scapis petiolos subæquantibus; umbellâ pauciflorâ involucris setaceis; calyce campanulato corollâ breviore, fructifero ampliato.

Habitat in sylvis prope Katmandu Napaliæ, vigens initio anni.

Nomen *Boolle Soah.*

Radix gracilis nigricans fibrillosa.

Folia plura, erecto patentia, regulariter sinuata, lobis latis rotundato-acutis, baseos approximatis, bi-tripollicaria, supra rugosula, pilis hyalinis geniculatis præcipue ad vasorum tractus obsita, ciliata, subtus glabriora, venulosa, costâ nervisque alternantibus prominulis.

Petioli teretes, graciles, folium æquantes purpurascentes, basi membranaceo-dilatati, uti scapi umbellæque vestiti villis copiosis longis rufescentibus.

Scapi plures, filiformes, erecti.

Umbella patens, pauciflora, radiis capillaribus pollicaribus. *Involucrum* constans bracteolis lineari-subulatis vix bilinearibus villosis, pedicellos numero æquantibus.

Flores majusculi.

Calyx obsoletè quinquangularis, fundo rotundato, laciniis quinque ovatis acutis ciliatis, patulis.

Corolla albida, utrinque villosula. *Tubus* cylindricus calyce angustior medio vix dilatatus. *Fauces* nuda, leviter contracta, flavescens. *Laciniæ* tubo breviores subobovatæ leviter retusæ patulæ.

Filamenta brevissima, laciniis corollæ alternantia. *Antheræ* erectæ medium tubi haud attingentes.

Ovarium subrotundum, glabrum, obsoletè quinque-sulcatum, uniloculare polyspermum, ovulis placentæ centrali stipitatæ insertis. *Stylus* capil-

[illegible] capitato-elevatum supra staminibus parum elevatum. *Capsula* [illegible] recondita, basi styli [illegible] acutas. *Semina* [illegible] ta placentæ [illegible] pedicellat[illegible].

Observation. The opinion [illegible] (i.e. Br[illegible]MAN,) and Sir J. E. SMITH, relative to *Androsace rotundifolia* (*Exot. Bot.* 2. p. 113) applies with equal force to this pretty little plant; both are belonging to Androsace, to which genus *Cortusa Gmelini* ought also to be referred, as has been remarked by GÆRTNER and LAMARCK. The affinity between the latter and my plant is very great. All its parts, especially the footstalks and calyces are befet with long very soft, transparent, beautifully articulated hairs, which frequently have a reddish or purplish tint. The leaves are said to possess a disagreeable smell when fresh.

Primula prolifera. *Wall.*

Glaberrima, nuda, foliis oblongis subspathulatis obtusis dentatis petiolatis, scapo longissimo, floribus umbellatis demum verticillatis, bracteis linearibus s. foliaceis difformibus.

Habitat in montosis prope Sylhet Bengalæ orientalis ubi floret a Februario usque ad Aprilem.

Planta omnibus partibus glabra, farinaque carens.

Radix constans fibris crassis cylindricis cornosis rubicundis, radiculas capillares breves exserentibus.

Folia erecto-patentia, ovate obovata, argutè denticulata, valde obtusa, suprà leviter convexa, subtus costâ magnâ nervisque prominentibus notata, deorsum attenuata in *petiolum* latum canaliculatum marginatum; spithamea ad dodrantalia et ultra.

Scapus gracilis teres erectus, foliis fere duplo longior.

Umbella terminalis, densa, mox post anthesin, elongatione caulis sensim mutata in verticillos duos, tres quin quatuor multifloros, inferiores remotiusculos pollicem unum distantes.

Bracteæ plures subulatæ s. lineares, pedunculis parum breviores basi gibboso-dilatatâ connatæ; nunc infra verticillum inferiorem difformes foliaceæ lanceolato-ovatæ, acutæ, undulatæ, crenulatæ, ipsum verticillum longitudine æquantes.

Flores in singulo verticillo viginti v plures, erectiusculi, flavi, fragrantissimi, pedunculis insidentes erectiusculis gracilibus sesquipollicaribus, raro ad medium bracteolâ parvâ munitis.

Calyx tubulosus basi obsoletè quinquangularis; laciniæ lanceolatæ, acutæ dorso convexæ.

Corolla hypocraterifomis. *Tubus* calyce duplo v triplo longior, cylindricus, decemstriatus, sursum leviter ampliatus. *Limbus* planus, laciniis obcordatis crenulatis basi contractis, sinu acutangulo integerrimo. *Faux* contracta, notata tuberculis quinque minutis bilobis.

Ovarium globosum. *Stylus* brevissimus. *Stigma* subcapitatum.

Filamenta subulata, supra basin tubi inserta. *Antheræ* erectæ, oblongæ inclusæ.

Capsula subglobosa stylo persistente coronata; matura haud visa.

Observation. For this valuable *Primrose* I am indebted to the industry and success of my assistant at *Sylhet*, Mr. M. R. Smith, who sent plants to the botanic garden towards the close of 1817, producing abundance of elegant and sweetly perfumed flowers the next February. I have no doubt that this species as well as the not less desirable *P. denticulata* of Sir J. E. Smith, (*Exot. Bot.* 2. *pag.* 109) which I have received both from *Sylhet*, and *Napaul* and which has also blossomed freely this year, may be cultivated with facility and propagated from their fleshy roots, which possess the smell of anise peculiar to several members of this genus.

The only species with which this elegant plant may be confounded is *Primula verticillata*, Forsk. flor. arab. 42, figured by my venerated preceptor, the late professor M. Vahl in the 1st vol. of his *Symb. bot. tab.* 5. In the following particulars, however they differ sufficiently to be easily distinguished. My plant is perfectly smooth and has no tendency whatever to become mealy. Its leaves are oblong and rounded at their end, and their border finely denticulated. The whorls are many flowered with erect or adpressed bractes, which vary in their form, but generally are leafy in the lowest and linear in the others. The flowers are at first collected in a terminal umbel, soon after they have expanded the stalk shoots up from their centre, and is terminated by another umbel. In this manner three or four successive umbels become as many verticils. The corolla seems to be altogether larger; and the crenulated margins of its border wanting in *P. verticillata*.

Campanula stricta. *Wall.*

Aspera pilis brevibus rigidis, caule gracili tereti subdichotomo, ramis simpliciusculis strictis, foliis liniaribus integerrimis sessilibus, mediis approximatis, calycibus subpaniculatis prismatico-turbinatis tubum campanulatum subæquantibus, corollis puberulis, laciniis lanceolatis, capsulis poris sex ad basin dehiscentibus.

Habitat in pratis prope Katmandu, florens initio anni.

Nomen vernaculum *Nausa Soahr*

Planta pedalis basi simplex, medio ramosus, omnibus partibus a pilis copiosis albicantibus aspera.

Folia sessilia, sparsa, bipollicaria, angustissima, leviter undulata, erectiuscula, ciliata, basi angustata, utrinque piloso-aspera, subtus costâ nervisque aliquot prominulis albicantibus.

Flores terminales subpaniculati majusculi, campanulati, cœrulei.
Pedunculi capillares elongati ad basin bracteolâ subulatâ muniti.
Calyx nervoso-angulatus, laciniis erectis lanceolatis acutis.
Corollæ tubus amplus *limbo* patente subcrenulato.
Stamina brevia. *Stigma* trilobum, lobis teretibus crassis patulis, *styloque* pubescentibus.
Capsula tres lineas longa, inter nervos bascos poris inæqualibus dehiscens.
Observation. This species approaches to *C. gracilis, Forst.* differing, however in its bell-shaped corol, the singular dehiscence of its capsule and the entire leaves.

Campanula pallida. *Wall.*

Hirsuta, foliis lanceolatis serratis subpetiolatis, caule ramoso, pedunculis longissimis terminalibus subpaniculatis, laciniis calycis corollam campanulatam fere æquantibus.
Habitat in Napalia ad loca sterilia. Floret cum præcedente.
Erecta, pedalis bipedalisque, omnibus partibus obsita pilis densis canis patentibus.
Radix lignosa, grysea.
Caulis teres, angulosus, subflexuosus, basi ramosus. Rami graciles alterni, simplices, subfastigiati.
Folia alterna, patentia, lanceolata, utrinque acuta, crenato-serrata, pollicaria v. sesquipollicaria, basi attenuata in petiolum brevem marginatum, utrinque pilis densissimis cavis mollibus vestita. Superiora f. *floralia* linearia, eroso-dentata, unguicularia.
Flores terminales caulis ramularumque, solitarii, pedunculati, albidi, paniculam formantes tenuem, terminalem, subfastigiatam.
Pedunculi filiformes, pollicares bipollicaresque, teretiusculi, nudi f. medio folioto lineari stipati erecto-patentes, calycesque pilosi.

Calyx turbinatus, quinquangularis, laciniis patentibus lanceolatis valde acuminatis corollam fere æquantibus.

Corolla campanulata striata extus pilosa, laciniis lanceolatis acutis.

Filamenta subulato-capillaria e basi triangulari incurvatâ ciliatâ; *antheræ* conniventes elongatæ, lineares, apice filamenti denudatâ terminatæ, faucem haud attingentes.

Ovarium vertice glabrum. *Stylus* pubescens. *Stigmata* tria subulata recurvata.

Observation. I possess specimens of a plant, which probably is only a variety of this species, with radical and lower leaves oblong lanceolate dentate, purplish on the under surface; the upper ones linear-lanceolate, two inches long and remotely denticulated or almost entire; flowers pale blue. They were also collected in the fields near *Katmandu*.

Lobelia pyramidalis. *Wall.*

Lævis, caule erecto paniculato, foliis lanceolatis attenuato-acuminatis serrulatis, floralibus linearibus, racemis paniculatis foliosis, laciniis calycinis corollam æquantibus.

Habitat in Napalia et Bengala orientali florens mensibus anni prioribus. Nomen Kasianum *Atia chao*.

Planta herbacea lævis, erecta, tri-quadripedalis foliosa, caule ramisque foliorumque marginibus plerumque violaceis.

Caulis teres, crassus, medullosus, angulis aliquot obtusis e ramulorum insertione decurrentibus notatus, basi simplex, sursum ramulis axillaribus copiosis erecto-patentibus paniculatis simplicibus.

Folia sessilia, sparsa, patentia, elongata lanceolata serrulata, in acumen gracile attenuata, basi angustata, tenuia, costâ subtus elevatâ nervisque arcuatis, rediculato-venosa; inferiora dodrantalia et

ultra, medii caulis angustiora brevioraque, 4-6 pollicaria; suprema linearia angustissimè acuminata, bipollicaria.

Racemi terminales ramulorum omnium caulisque, paniculati, multiflori, oblongi, foliosi.

Pedunculi sparsi, approximati, patentes, filiformes, unciales, basi suffulti foliolo florali s. *bracteâ* lineari filiformi subintegerrimâ, ipsum longitudine paulo superante.

Flores albi vel pallide violacei, odorati.

Calyx oblongus, laciniis lineari filiformibus longissimis.

Corolla basi subtubulosa, secunda, juxta totam longitudinem fissa, intus puberula, laciniis ciliatis, tribus intermediis lanceolatis, lateralibus duabus linearibus profundius separatis.

Filamenta distincta, linearia, ciliata. *Antheræ* violaceæ in tubulum apice incurvum cohærentes dorso pilis aliquot vestita, inferiores duæ fasciculo pilorum terminata.

Ovarium biloculare. *Stylus* filiformis. *Stigma* puberulum bilobum subexsertum.

Observation. In the beginning of 1816 I received for the first time specimens of this elegant *Lobelia* from my assistant Mr. Smith at Sylhet: and in the beginning of 1818 I had abundance from Napaul. Its racemes are numerous and leafy and give the plant a very gay appearance.

Lobelia begonifolia. *Wall.*

Repens villosa herbacea, foliis brevè petiolatis subrotundo-cordatis dentatis basi inæqualibus, pedunculis axillaribus unifloris folium subæquantibus ebracteatis, laciniis calycinis linearibus acuminatis, medio vel basi 1-v.-2 dentatis corollæ tubo paullo longioribus.

Habitat in agris prope Katmandu, vigens Aprili, Maio.

Nomen *Toshephoga.*

Caulis elongatus teres prostratus laxus, ramis [illegible] indicantes apicibus leviter assurgentes graciles simplicissimi, [illegible] villis brevibus mollissimis canis hyalinis.

Folia alterna subbifaria, polliciaria vel infra [illegible] boscoe rotundatis inæqualibus altero interdum [illegible] acutè [illegible] grossè dentata præcipue extrorsum, inferiora rotundato obtusa, superiora minora acuta, suprà glabriora subtus pallida ad vasa villosa, venoso nervosa.

Petioli vix semiunguiculares, suprà sulcati, apice parum dilatati.

Pedunculi pauci, erecti, crassiusculi, folium subæquantes raro longiores.

Calycis laciniæ glabræ, attenuato-acuminatæ.

Corolla coerulescens intus puberula, tubo fisso, limbo unilaterali, laciniis linearibus, lateralibus profundius separatis.

Filamenta apice connatæ. *Antheræ* violaceæ imberbes, inferiores duæ pilo brevi cano terminatæ.

Ovarium oblongum medio leviter ventricosum, glabrum. *Stigma* integrum villosulum.

Capsula subrotunda, matura haud visa.

Observation. This elegant species is easily distinguished from all the others by its oblique leaves which in this respect are like those of a *Begonia*. The stems are creeping to a considerable extent rooting at short distances and sending forth fascicles of ascending generally simple, from 6 to 10 inches long branches, some of which lay down again and strike roots.

Uvularia parviflora. *Wall.*

Foliis oblongo-lanceolatis valde acuminatis petiolatis, pedunculis oppositifoliis elongatis apice bracteâ foliaceâ, floribus umbellatis infundibuliformibus, filamentis nanis antheras subæquantibus

Habitat in nemoribus Napalia, vigens Aprili, Mayo.

Nomen Doola Soah.

Planta erecta debilis sæpe fruticibus vicinis superincumbens, omnibus partibus lævis tripedalis v. orgyalis.

Radix horizontalis crassa, emittens fibras copiosas carnosas cylindricas.

Caules aliquot teretes nitidi glaucescentes erecti nudi infernè usquè ad digitum minimum crassi, induti vaginis bipollicaribus membranaceis acuminatis laxis purpureo-punctatis, supernè dichotomè ramosi. *Rami* debiles hinc inde curvi foliosi subsimplices.

Folia oblonga in acumin longum gracile attenuata, basi acuta, margine membranaceo asperulo, ad lentem denticulata, plana multinervia striata sexpollicaria, pollicem lata, superiora angustiora.

Petioli vix semiunguiculares a decurrente folio marginati, plano-sulcati, basi dilatatâ semiamplexante.

Pedunculi versus summitates plures, erectiusculi, bipollicares, angulati papilloso-punctulati, infra apicem incurvam leviterque incrassatam folio florali rameis simili instructi, sexflori. *Pedicelli* filiformes, pollicares, umbellati ebracteati.

Flores cernui, e fusco flavescentes, infundibuliformes vix semiunciales, profundè sexpartiti, basi contractâ protuberantiis sex æqualibus brevibus gibbosâ. *Laciniæ* lanceolatæ, acuminatæ, extus carinatæ, intus planæ laeves, basi incrassatæ excavatæ in tubulum brevissimum; interiores tres paulo minores.

Stamina perianthii dimidium vix superantia, inter ejus basin et ovarium inserta, recta. *Filamenta* brevissima crassa, latiuscula, antheris oblongis obtusis basi cordatis, parum breviora.

Ovarium triloculare ovatum, ovulis pluribus placentæ centrali adfixis. *Stylus* brevis crassus. *Stigmata* tria cylindrica patula obtusa, parum supra antheris elevata.

Uvularia umbellata. *Wall.*

Foliis subsessilibus ovalibus acutis, superioribus lanceolatis acuminatis,

umbellis oppositifolis breve pedunculatis bracteâ foliaceâ instructis, pedicellis elongatis divaricatis, staminibus perianthium fere aquantibus, antheris filamento triplo brevioribus.

Habitat et viget cum antecedente cui radice caule ramisque similis, staturâ vero minor graciliorque.

Folia bi-tripollicaria brevissimè petiolata, inferiora basi rotundata, superiora lineari lanceolata, basi acutâ.

Pedunculus umbellulæ brevis crassus valde incurvus subtus margine intermedio papilloso cristato interdum duplici notatus. *Pedicelli* bipollicares subdeflexi.

Perianthium flavum, cernuum, profundè sexpartitum, pollicare, basi angustatâ subtubulosâ gibberibus sex rugosulis, alternis (laciniarum interiorum) minoribus notatum, superne ampliatum patens. *Laciniæ* lineari-cuneatæ, striatæ, acutiusculæ, subdenticulatæ, pilis brevibus argenteis adpressis consperſæ, leviter ciliatæ, basi angustatâ desinente in sacculum brevem cujus margini adfixum est stamen.

Filamenta filiformia erecta. *Antheræ* ad faucem floris.

Ovarium turbinatum, breve. *Stylus* gracilis stamina æquans. *Stigmata* elongata patentia, hinc puberula, clavata, supra antheris elevata.

Observation. This species seems to differ from U. chinensis. (Bot. Mag. Vol. xx. 916) in having yellow long peduncled flowers placed in spreading umbellets opposite to the insertion of the leaves; in the segments being narrower and slightly pubescent, and the stigma raised above the long stamina.

I am in possession of a third apparently different plant, which from want of complete specimens I am not able at present to determine satisfactorily.

Convallaria oppositifolia. *Wall.*

Caule tereti, foliis oppositis petiolatis ovatis v. oblongis acuminatis glabris, pedunculis axillaribus nutantibus multifloris, perianthiis infundi-

buliformibus.

Habitat in montibus Bengaliæ orientalis, etiam in Napalia.

Nomen khasianum, *Kattia Sekuria.*

Radix perennis, magna, carnosa, constans nodis pollicaribus ovatis f. rotundatis laevibus, vertice faveâ notatis amplâ duplici, deorsum fibras copiosas crassas aliasque capillaceas emittentibus.

Caules ex eadem radice numerosi obliquè adscendentes f. inclinati, tri-quadripedales, apice subnutantes, uti omnes plantæ partes laeves, nitidi, basi leviter incrassati, vaginati, punctis copiosis purpureis obsiti, teretes f. leviter compressi, firmi, crassitie calami scriptorii, obsoletè articulato flexuosi. *Vaginæ* aliquot ad inferiorem partem caulis erectæ alternæ cylindricæ striatæ purpurascentes ore obliquæ acutæ, emarcescentes.

Folia adscendentia, secundum patentia, firma, subcoriacea, tri-quadripollicaria, in acumen gracile lineare attenuata, basi acuta, margine subrevoluta, lucida, supra atroviridia juxta nervos sulcata, subtus pallida 5 ad 7 nervia nervis alternis obsoletis, costâ elevatâ carinatâ. Juniora (turionum novellarum) decussatim opposita, laetissimè virentia.

Petioli brevissimi, vix semiunguiculares, crassi, suprà sulcati.

Flores e latere inferiore caulis, i. e. illo foliorum opposito provenientes nutantes, inodori, albi, punctis purpurascentibus consperfi, laciniis viridescentibus.

Pedunculi axillares, solitarii, unguiculares, punctati, 3 ad 8-flori. *Pedicelli* gracillimi clavati semipollicares, basi medieve bracteolâ capillari incurvâ.

Perianthium apice leviter contractum, laciniis patentibus lanceolatis acutis, apice intus fasciculo villorum munitis.

Filamenta supra basin perianthii inserta, conniventia. *Antheræ* lineares sagittatæ exsertæ, conum formantes acutum stigma includentem.

Ovarium oblongum, teres, triloculare, trisulcum, loculis polysporis. *Stylus* filiformis subclavatus. *Stigma* subtrigonum villis plurimis hyalinis obsitum.

Bacca rubra, laevis, trisulca, magnitudine pisi, loculis tri-v. tetraspermis. Coet. ut in Convallaria majali, Gaert. carp. 1. 59. t 16.

Observation I am indebted for roots of this plant to the industry of Mr. Smith. They produced new shoots in February 1818, which blossomed the next month. The elegantly formed arched and shining leaves and the pretty, drooping flowers add to the interest, which this plant cannot fail creating in those, who have been delighted with the fragrance and beauty of its cognate *Lily of the valley* and *Salomon's Seal*. Its root is formed precisely like that of the latter (Convallaria Polygonatum) and it partakes of its whole habit, ~~while its opposite leaves, affording another~~ instance of true petiols in this genus, sufficiently distinguish it from that and all the other species.

I have since the abovementioned period received abundant supplies of roots seeds and specimens from *Napaul* through the liberality of the Honorable Mr. Gardner.

Convallaria cirrhifolia *Wall.*

Scandens; foliis verticillatis senis linearibus apice cirrhatis.

Habitat in Napalia ubi vocatur *Goobasa*. Floret Aprili, ad Mayum.

Radix carnosa, digitum circiter crassa, nodis elongatis foveolatis.

Caulis uti tota planta laevis, leviter glaucescens, teres, crassitie calami scriptorii, attenuato elongatus, quadripedalis, debilis simplex scandens basi nudus et purpureo-maculatus.

Folia lineam vel duas lata, pollices tres ad quatuor longa, striata, costa subtus elevata, cauli approximata, marginibus revolutis, bas

subincrassata, apice attenuata in cirrhum brevem recurvatum filiformem semipollicarem; inferiora solitaria opposita ternave, reliqua disposita in verticillos sexfolios numerosissimos internodiis longiores, superiores valde approximatos.

Pedunculi axillares, tot quot folia, vel pauciores, teretes, semipollicares, nutantes, triflori. *Pedicelli* capillares pedunculos longitudine subæquantes, clavati, basi vel infra medium instructi bracteolâ albâ capillaceâ deciduâ.

Flores penduli, albi,

Perianthium tubulosum unguiculare, sexcostatum, versus faucem leviter contractum. Laciniæ ovatæ obtusæ apice intus acervulo villorum terminatæ.

Filamenta infra basin laciniarum inserta iisque opposita subulata brevissima. *Antheræ* lineares, filamentis longiores subsagittatæ, parum exsertæ.

Ovarium teres subcylindricum triloculare, loculis bi-vel trisporis; *ovula* axi adfixa. *Stylus* filiformis. *Stigma* villis s. papillis hyalinis obsitum.

Observation. The only species to which this remarkable plant has any affinity is *Convallaria verticillata* from which, however, it is easily distinguished at first sight by the numerous many leaved verticils and the tendril at the end of each leaf.*

Daphne involucrata. *Wall.*

Capitulis axillaribus lateralibusque pedunculatis erecto-patentibus involucratis, perianthiis sericeo-villosis, foliis alternis oblongo-lanceolatis

* Since the above description was presented to the Society I have got a copy of Hodburie's Lilliaceæ in which, Vol. VI. 815, there is a description of *Polygonatum sibiricum*. This species, which none of the botanical authors in my possession quotes, is exceedingly like my plant; it seems however to differ in having few-leaved verticils and in the bractes being much larger.

petiolatis acuminatis, subtus glaucescentibus.

Habitat in sylvis montium prope Sylhet Bengalæ orientalis, florens tempore frigido.

Frutex ramosissima.

Rami teretes, glabri, cortice castaneo nitente, aetate albicante.

Folia alterna, raro opposita, petiolata, integerrima, tri-quadripollicaria, basi acuta, coriacea, glaberrima, suprà nitida, costâ valde prominente nervisque copiosis subtransversalibus, reticulato-venosa.

Petioli brevissimi, suprà plano-sulcati.

Stipulæ ad folia primordialia subulatæ, pilosiuscula, admodum caduca, nullo earum vestigio manente.

Capitula axillaria et lateralia in axillis foliorum præteriti anni, pedunculata, hemisphærica, erectiuscula, solitaria, ramis geminata, sex-ad decemflora.

Pedunculi pollicares vel infrà, filiformes, graciles, incrassato-clavati, villosi, basi muniti bracteolis aliquot subulatis deciduis.

Involucrum caducum, purpurascens, diphyllum. *Foliola* ovata, obtusa, concaviuscula, semiunguicularia, integerrima, pubescentia, intus sericea, striata, æstivatione florum capitulum omnino includentia.

Flores sessiles, albi, suaveolentes.

Perianthium hypocrateriforme, gracile, semipollicare, extus villis densissimis adpressis sericeis intus glaberrimum, marcescens limbo patente quadrifido; *laciniæ* lanceolatæ, acutæ, imbricantes: duæ oppositæ minores, æstivatione inclusæ. *Faux* nuda pervia.

Stamina octo, erecta, seriebus duabus tubo inserta; superiora quatuor subexserta, laciniis opposita; inferiora iisdem alternantia in medio tubi. *Filamenta* capillaria, brevissima. *Antheræ* lineares s. oblongæ, utrinque longitudinaliter dehiscentes, biloculares.

Pistillum brevissimum, quartam perianthii partem haud excedens. *Ova-*

rium oblongum, basi nectario membranaceo cylindrico truncato integerrimo cinctum, supernè villis longis erectis barbatum, uniloculare, monosporum, ovulo vertice adfixo. Stylus filiformis villis ovarii occultus, iisque vix longior, leviter tortuosus. Stigma magnum, capitatum, corneum, luteum, rugulosum, vertice retusum.

Observation. Specimens of this handsome shrub were sent to me in 1815 from Sylhet, by Mr. M. R. SMITH, who informs me that a very good and durable kind of hemp is prepared of its fibrous bark. With the exception of their being permanently erect, the heads of flowers agree well with Sir J. E. SMITH's excellent description of those of Daphne pendula. Plant. ined. fasc. ii. 34.

Daphne cannabina, Loureir.?

Floribus aggregatis terminalibus sessilibus bracteatis, perianthiis pubescentibus; foliis lanceolatis sparsis sessilibus, retusis vel acutiusculis.

Daphne cannabina, umbellis terminalibus, foliis lanceolatis oppositis. Loureir: cochinch. ed. Willd. i. 291. ?

Habitat in montosis *Hindostaniae* meridionalis, e *Napalia* usque ad provinciam *Kamoon*, florens Decembre ad Martium. Fructus maturescunt mensibus Aprili et Maio.

Nomen *Set-Burooa*. Nepalensibus *Bhulloo-Soang*. ‡

Frutex sex-ad octopedalis, ramosissima, ramis sparsis rigidis teretibus, cortice pallido glabro rugosulo, intus sericeo-fibroso.

Folia approximata, subcoriacea, lanceolata, s. oblongo-lanceolata, utrinque attenuata, apice sæpissimè retusa, interdum acuta, tri-quadripollicaria, glaberrima, atroviridia, suprà nitida, subtus opaca, costâ elevatâ nervisque gracillimis sublongitudinalibus, interdum obsoletè et remotè crenulata.

‡ I understand from Mr. Gardner that *Soang*, *Soom* and *Sua* are synonymous terms in the language of *Nepaul*, and signify "flower."

Flores majusculi, albi, fragrantissimi, duodecim circiter congesti in capitulum terminale, sæpe (ut jam monuit Cel. J. Sims, sub Daphne adora, Botanical Magazine, vol. xxxvii. 1587) apice rami elongatâ pubescente pedunculatum, suffultum bracteis (foliis tenellis?) lanceolatis acuminatis glabris unguicularibus.

Perianthium tubulosum, extus pubescentiâ copiosâ sericeâ obsitum, tubo cylindrico unguiculari, receptaculo dilatato tuberculato pubescenti subadnato; limbo patentissimo quadripartito, laciniis ovatis subretusis vel lanceolatis acutis. Faux pervia.

Stamina ut in priore. Series superiorum supra faucem elevata.

Pistillum lævè. *Ovarium* oblongum basi circumdatum annulo obsoleto angustissimo carnoso sublobato. *Stylus* et *Stigma* præcedentis.

Drupa ovato-oblonga, acuta, glabra, rubra. *Putamen* tenuissimum, submembranaceum, pallidum.

Semen globosum, album.

Radicula conica, foveolæ baseos cotyledonum leviter immersa. *Plumula* punctiformis.

Cætera ut in *Thymelæa Mezereo*, Gaertn. carp. I. 188. tab. 39.

Observation. Among the extensive and constant supplies of plants and seeds from *Napaul* which the botanic garden owes to the liberality of the Honorable EDWARD GARDNER, Resident at *Katmandu* are also specimens and plants of the Paper-shrub, which I am informed by that gentleman grows very commonly in that country, and when in flower is exquisitely fragrant. It appears there are two varieties, one with perfectly white the other with reddish flowers; both are used for ornament and for the manufactory of Paper, of which I am enabled to present to the Society's Museum specimens of various dimensions and texture. The common kind measures generally about two feet square. The finest kind measures ten feet in length by 4 feet in breadth; and is manufac-

tured chiefly in *Dotee*, a province to the eastward of *Kamoon*. It approaches in softness and size to that which is made in *China*, and it is not improbable that some of the latter may be produced from the same material. LOUREIRO mentions that paper is manufactured in the neighbouring kingdom of *Cochinchina* from the bark of his *D. cannabina* which seems to differ only in having opposite leaves: a circumstance which may perhaps be owing to culture. It comes extremely near to *D. adora* of THUNBERG and *B. indica* of OBECK, which (at least that described in the *flora cochinchinensis*) Dr. SIMS with great propriety suggests may be only a variety of the former. The question respecting the identity or difference of these three plants can be settled only by those, who have the means of comparing specimens of them.

I am indebted for an account of the manner of preparing the paper from the bark of this charming shrub, and for some parts of the description given above, to the communications of Lieut. H. R. MURRAY, and to the following notes extracted from the official correspondence of that gentleman with the Military Board at Calcutta.

"The *Set-burooa* or Paper-shrub is found on the most exposed "parts of the mountains, and those the most elevated and covered "with snow, throughout the province of *Kamoon*. In traversing "the oak forests between *Bheemtah* and *Ramgur*, and again from "*Almora* to *Chumpawat*, and down towards the river, it has come "under the immediate observation of the writer of these com- "munications that the *Set-Burooa* or Paper-plant only thrives "luxuriantly where the oak grows; so that it is not likely that "it will succeed in the plains. It is hardy and attains a height "of 5 to 6 feet; blossoming in January and February, and ripen- "ing its acrid red fruit about the end of April. The paper pre- "pared of its bark is particularly calculated for cartridges, being

"strong, tough not liable to crack or break, however much bent "or folded, proof against being moth-eaten, and not in the least "subject to dampness from any change in the weather; besides, "if drenched or kept in water for any considerable time, it "will not rot. It is invariably used all over *Kumoon*, and in great "request in many parts of the plains, for the purpose of writing "*Nusubnamees* or genealogical Records, Deeds &c from its ex-"traordinary durability. It is generally made about one yard "square, and of three different qualities. The best sort is re-"tailed at the rate of 40 sheets for a current rupee, and at whole-"sale 80 sheets. The second is retailed at the rate of 50 sheets "for a current rupee and 100 at wholesale. The third of a much "smaller size, is retailed at 140 sheets, and wholesale 160 to 176, for "the rupee. The following is the very simple process of manufactur-"ing this paper. After scraping off the outer surface of the bark, "what remains is boiled in fair water with a small quantity of "the ashes of the oak, a most necessary part of the ingredients, "which has the effect of cleaning and whitening the stuff. Af-"ter the boiling, it is washed and immediately beat to a pulp "with small mallets on a stone, so that when mixed up in a vat "with the fairest water, it has the appearance of flour and water. "It is then spread on moulds or frames made of common bamboo "mats."

Daphne Gardneri. *Wall.*

Capitulis lateralibus pedunculatis sericeis maximis exactè globosis, perianthii laciniis subrotundis, interioribus crenulatis, stigmate acuto oblongo, foliis lanceolatis acutis petiolatis, subtus villosis.

Habitat in montibus Napaliæ, ubi floret vigetque initio anni.

Nomen vernaculum *Ghuckmatee Soah.*

Frutex orgyalis, staturâ et habitu antecedentis, ramis copiosis teretibus fuscis pubescentibus, junioribus leviter angulatis villosis.

Folia sparsa, utrinque acuta v. subacuminata, 4 ad 5-pollicaria, pollicem circiter lata, integerrima, suprà glabra, subtus obsita pilis mollissimis longis adpressis, præsertim juxta vasa glaucescentia, costâ nervisque brevibus prominentibus albicantibus. Tenella uti capitula tomento vestita sericeo mollissimo densissimo.

Petioli villosi, semiunguiculares, suprà sulcati.

Flores subcarnosi flavi fragrantissimi, pollicares, extus capiosissimè et densissimè villosi, intus laeves, sessiles, quinquaginta circiter congesti in capitula ad ramulos lateralia, erecto-patentia demum nutantia, globosa, diametri sesqui-vel bipollicaris, basi cincta involucro octo-v. decemphyllo emarcescente deciduo intus sericeo, foliolis lanceolatis acuminatis unguicularibus, reflexis et a floribus occultis.

Pedunculus subcomplanatus, pubescens, clavatus, striatus, sublignosus, pollicaris v. sesquipollicaris apice valde tumidus et intra involucri foliola elevatus in receptaculum semiglobosum crassum faveolatum villosum.

Perianthii tubus amplus cylindricus pallidus basi apiceque leviter contractus, rectus. *Limbus* patens, laciniis obtusis, interioribus (i. e. illis æstivatione reconditis) inæqualiter crenulatis.

Antheræ ovatæ, utrinque juxta totam longitudinem dehiscentes: series superiorum supra faucem perviam exsertae.

Ovarium obovatum, superne densissimè barbatum, basi cinctum annulo membranaceo crenulato angustissimo. *Stylus* filiformis, pubescens. *Stigma* subcylindricum, acutum, carnosum, stylo longius, vix ad inferiorem antherarum seriem elevatum.

Observation. Nothing can exceed the beauty and fragrance of this lovely shrub, which I lately received from, and which I have the greatest satisfaction in naming after its discoverer, the Honorable

Edward Gardner, of whose invaluable botanical communications I have already had several occasions to speak before this learned Society. It is owing to the ready and most liberal compliance of that Gentleman with my wishes that I have been enabled to send two of my people to *Napaul*, under the sanction of Government, for the express purpose of collecting plants, seeds and preserving specimens for the Honorable Company's Botanic Garden at Calcutta; and it is to the protection and assistance he has invariably granted to them in their excursions in that novel country, as well as to his own individual researches, that I have to attribute the frequent and extensive additions which since September 1817 have almost daily been made to the riches of this institution, forming a memorable and important Æra in its annals. Among the many useful and ornamental vegetable productions thus received, this new and distinct species of *Daphne* stands foremost. I am informed it grows to be a large shrub and is cultivated extensively about *Katmandu*, both on account of its beauty and perfume, and also on account of the utility of its bark, affording a material of which a superior sort of paper is made in *Napaul*. The process of this manufactory, as well as the essential qualities of the paper, of which I have the satisfaction to present musters to the Society, does not differ from those of the other species.

Andromeda lanceolata. *Wall.*

Fruticosa, racemis terminalibus basi foliosis secundis brevibus simplicibus, corollis subovatis, filamentis ciliatis *apice* sagittatis, antheris muticis biporis, foliis lanceolatis utrinque acutis integerrimis, subtus puberulis.

Habitat in montosis Bengalæ orientalis ubi floret nitio annd.

Nomen Khasianum *Kattia-atianga.*

Rami rigidiusculi; juniores incano-villosi.

Folia sparsa, approximata, pollicaria et sesquipollicaria, coriacea, supra laevia nitida, subtus vasculosa, nervis suboppositis longitudinalibus reticulatis; pubescentia; adultiora glabra.

Petioli vix semiunguiculares, pubescentes, suprà canaliculati.

Racemi terminales omnium ramulorum, rarius laterales, solitarii, cylindrici, bipollicares, basi foliosi, pedunculo tereti angulato pedicellisque unguicularibus puberulis.

Flores parvi, alterni, albi, cernui, pilis argenteis paucis adspersi, bracteolâ lineari ad basin pedicellorum.

Calyx urceolatus planiusculus, coriaceus, laciniis lanceolatis.

Corolla calyce pluries longior subcylindrica fauce parum contracta, leviter angulata. *Laciniæ* brevissimæ, ovatæ, acutæ patulæ.

Filamenta capillaria, villis longis obsita, basi dilatata, infra apicem utrinque instructa denticulo subulato deorsum vergente, inde subsagittata. *Antheræ* oblongæ, basi emarginatæ, *apice* poris binis obliquis dehiscentes.

Ovarium subovatum quinquesulcatum. *Stylus* longitudine circiter staminum, *Stigma* clavato-truncatum.

Capsula ferruginea magnitudine seminis piperis nigri, costis quinque dilutioribus elevatis ad commissuras valvarum. *Semina* plurima.

Andromeda ovalifolia. *Wall.*

Arborea, racemis lateralibus subterminalibusque elongatis foliis longioribus simplicibus conjugatisque attenuatis secundis, corollis cylindricis, filamentis ciliatis *apice* sagittatis, antheris muticis biporis, foliis ovalibus integerrimis acuminatis ferrugineo-nervosis.

Habitat in Napalia, florens capsulisque onusta Martio usque ad Junium.

Nomen *Sagechu* et *Sheabogi*.

Ramuli teretes, nitidi, glabri, castanei, tenelli leviter compressi resinoso-

punctulati, pubescentes.

Folia approximata, patentia, sparsa, coriacea, cuspidulato-acuminata, basi rotundato-acuta integerrima, levissimé undulata, magnitudine varia, tri-ad quadripollicaria, utrinque conspersa pilis ferrugineis adpressis brevibus, præcipue juxta ramificationes vasorum, nervis approximatis suboppositis reticulatim anastomosantibus. Juniorum ramorum et floralia lanceolata, sesquipollicaria.

Petioli vix unguiculares, pilosuli, suprá canaliculati.

Racemi sex ad octopollicares, adscendentes, basi foliis aliquot floralibus villosis stipati. *Pedunculus* sublignosus, leviter angulatus, interdum punctis resinosis conspersus. *Pedicelli* filiformes, unguiculares vel infrá villosuli, basi bracteolâ lanceolatâ patente deciduâ.

Flores copiosi approximati albi, magni, cernui, inodori, pilis argenteo-fulgentibus adpressis.

Calyx urceolatus, coriaceus, glabriusculus, laciniis lanceolatis acutis patulis, nervosis.

Corolla semipollicaris, levissimé quinquesulcata, basi angustata, fauce parum contracta, laciniis ovatis acutis patulis.

Filamenta capillaria villis albis barbata, basi dilatata, apice infra antheram utrinque dente patulo deorsum spectante, inde subsagittata. *Antheræ* ovato-oblongæ, muticæ, apice poro gemino obliquo dehiscentes.

Ovarium glabrum, quinquecarinatum. *Stylus Stigmaque* ut in antecedente.

Capsula fusca, subrotundo-quinquangularis, costis quinque fasciatis elevatis, magnitudine pisi mediocris. *Semina* numerosa. Coet. ut in *A. calyculata*, Gaertn. Carp. I. 304. t. 63.

Observation. The leaves of this elegant tree vary considerably in size and form, from lanceolate to broad ovate, becoming almost cordate, more or less acuminate. They are of a firm and leathery texture, perfectly entire and without glands. The *arbutus* described by my esteemed friend COLONEL HARDWICKE in his tour to *Siri-*

nagur (Asiat. Research. vi. p. 300. *A. herpeticus*, Mss. Guib. Roxb.) of which with his usual liberality I have been favored with the original drawing, is exceedingly like my tree. It differs however besides having a berry while the pericarp of mine is decidedly a capsule, in its leaves wanting the coloured rib, and the racemes being much shorter. Indeed if I could suppose the attribute of a Berry to have been founded on a slight mistake in the examination of the unripe seed vessel, I would venture to consider them as one and the same plant.

Since writing the above my esteemed friend Dr. Govan, Superintendent of the Botanic Garden at *Saharunpore* has favored me with the following observations on this interesting tree and with specimens which he gathered on the confines of *Chinese Tartary*.

"Your *Andromeda ovalifolia* occurs first on the hills between *Nahn* and *Subhatoo* at an elevation (by Barometer) of about 3000 feet, and continues to that of 8000 feet after which it becomes very rare and soon disappears entirely. It is called by the same name as the species of *Sirinagur*, *Aiaar* or *Airee* and grows to a tree of 20 to 40 feet in height; the bark of the stem and older branches much cracked and rough, that of the former almost *suberose*. The middle rib of the leaf is coloured, sometimes *puniceous*; by drying both that and the nerves become ferrugineous. With regard to its use the same opinion prevails here as in *Sirinagur*, an infusion of the bruised leaves in water being considered a specific against cutaneous complaints of an herpetic nature both in the human species and in cattle; its operation is said to be attended with considerable pain. Sheep and Goats eat the leaves which, when young, are said to produce soporific and deleterious effects on them * When used as litter they are said to destroy insects in the stalls of the cattle. Excellent timber is so plentiful where this tree is found that its wood is only used for burning."

* Mr. Gardner informs me that a similar notion prevails in Nepal.

"I send you specimens of a very marked variety if not a distinct species which, if adopted, I propose calling *A. cordata*. It grows intermixed with your *ovalifolia* and exposed to similar external circumstances, and yet it preserves constantly its distinguishing character which consists in its leaves being much broader in proportion to their length, almost always cordate at the base, of a considerably more leathery texture and always longer than the racemes. In other respects, in habit, size, native name and uses the trees correspond exactly."

Andromeda fastigiata. *Wall.*

Fruticulus repens adscendens, ramis tetragonis fastigiatis, foliis sessilibus qvadrifariè imbricatis adpressis lanceolato-sagittatis lateribus revolutis dorso canaliculatis, floribus axillaribus solitariis subnutantibus campanulatis, filamentis *apice* sagittatis, antheris biporis pendulis.

E. Gossain—Than Napaliæ misit Dom. E. Gardner, e. confinibus Tartariæ chinensis G. Govan, M. D.

Nomen Napal. *Naba.*

Fruticulus palmaris ad dodrantalem basi nuda repens. *Rami* suboppositi simplices, stricti, fastigiati, 2-ad 6-pollicares, villosuli, teretes, propter foliola ubique imbricata tetragoni.

Folia decussatim opposita, coriacea, gibbosa, bilinearia, circumdata membranulâ ciliatâ apice in ligulam productâ, lucida, lateribus supra dorsum villosulum revolutis.

Pedunculi solitarii, uniflori, folio duplo fere longiores, subclavati, villosi, basi squamulis aliquot imbricatis ovatis.

Flos parvus, albus, nutans, glaber.

Calyx 5-partitus laciniis lanceolatis acutis membranaceo-marginatis.

Corolla calyce duplo longior, limbo 5 fido patenti, laciniis ovatis obtusis.

Filamenta capillaria apice aristis duabus descendentibus curvis capillacei

[illegible] longioribus.

[illegible] rectiore circumscriptione [illegible] fimbriatorum adfingente. [illegible] longior.

[illegible] globosa [illegible] perfectum brevior, [illegible] *erectis* [illegible]

[illegible] elegantissimi species approximatus [illegible] *erectis* [illegible] It forms a compact [illegible] ding shrub, which at first sight may easily be mistaken for a heath. The branches are usually four-sided, rarely undivided, though sometimes finding forth two or three shoots from the [illegible] are straight and all of the same height. The leaves are of a dark green shining colour; when they become old they assume a brownish tint and at length fall off, leaving the lower part of the branches and the whole creeping [illegible] They have a very peculiar conformation; the back [illegible] convex and ribbed with a deep longitudinal furrow along [illegible] the sides bent inward towards it. Their internal surface, [illegible] the branch, is fine and [illegible] lacerated membrane which [illegible] the [illegible] of the leaf into a fetaceous point covering the [illegible] of that part [illegible] ve, and entering its dorsal furrow. [illegible] few at the top of the branches, white, about four [illegible] ding.

Andromeda formosa. Wall.

Arborescens [illegible] nudis, corollis ovato fructibus [illegible] *erectis* [illegible] longiuscule [illegible] defloratis [illegible] defectentibus, [illegible]

Habitat [illegible] Nepalia, [illegible] *Wallich.*

[illegible] *Andromeda* [illegible] *Parbuta.* [illegible]

[illegible] te [illegible] foliis lanceolatis [illegible]

latis.

Folia versus summitates valde numerosa approximata patentia quadri- ad sex-pollicaria, coriacea, firma, utrinque glaberrima, in acumen gracile desinentia, basi acuta, margine incrassato serraturis parvis regularibus notata, suprà lucida, subtus costâ valde elevatâ crassâ nervis copiosis gracilibus, venisque pulcherrimé reticulatis.

Petioli crassi, semipollicares, suprà sulcati, sæpe rufescentes vel serrâginei.

Panicula terminalis et ex axillis foliorum supremorum, hisce duplo longior, erecta, pedunculata, ovata, densa, constans racemis erectis subadpressis sessilibus, sparsis, cylindricis, digitum vix longis.

Pedunculi sublignosi, angulati pubescentes, leviter glaucescentes. *Pedicelli* unguiculares puberuli, basi suffulti bracteolâ lanceolatâ, adque medium duabus aliis minoribus.

Flores cernui, albi, inodori, glabri.

Calyx coriaceus, quinquepartitus, laciniis lanceolatis acutis, punctis resinosis adspersus.

Corolla ampla, ventricoso-ovata, calyce triplo longior, nitida, laciniis brevissimis recurvatis subreniformibus obtusis.

Filamenta crassa, subulata, puberula, dimedium corollæ vix attingentia.

Antheræ aurantiacæ, oblongæ, loculis apice basique solutis, dorso subgibboso ad insertionem filamenti utrinque auctæ aristis duabus capillaribus antheram dimidiam superantibus arcuatis apice convergentibus.

Ovarium globosum, laeve, basi cinctum annulo carnoso obsoleto. *Stylus stigmaque* priorum.

Observation. This beautiful tree comes near to *A. japonica* and some other species with panicled racemes, it differs however specifically from them all. Its flowers are extremely copious forming dense terminal bunches of an elegantly oval form. The leaves are of

peculiarly firm and leathery texture, beautifully reticulated below, with the margin finely serrated from the very base almost to the end of their tapering points. They are perfectly smooth, measuring an inch or an inch and a quarter in breadth.

It is not unlikely that this tree may prove to be a kind of *Arbutus*, the corol seeming to partake more of the character of that genus than of *Andromeda*. Not having yet seen the fruit I am unable to decide this question.

Gaultheria fragrantissima. *Wall.*

Ramis flexuosis, foliis ovato-lanceolatis serratis utrinque acutis subsessilibus glabris, subtus resinoso-punctatis, racemis axillaribus solitariis folia æquantibus ovariisque incano-pubescentibus.

Habitat in Napalia; florens Aprili.

Nomen *Sneabogi.*

Frutex ramis rigidis fuscis teretibus leviter angulatis, junioribus pubescentiâ incanâ vestitis.

Folia alterna, interstitiis duplo longiora, patentia, coriacea, firma, tripollicaria, lanceolata vel ovato-lanceolata, serrulata, marginibus subrevolutis, suprà lucida, subtus pallida punctis copiosis resinosis elevatis purpurascentibus notata, costâ sub-carinatâ nervis inferioribus suboppositis totam fere folii longitudinem excurrentibus, reticulato-venosa.

Petioli brevissimi, crassi, profundè sulcati.

Racemi erectiusculi sessiles graciles multiflori pubescentes.

Pedunculus subflexuosus; *pedicelli* teretes vix lineas duas longi basi suffulti bracteâ lanceolatâ canaliculatâ patenti apiceque infra calycem aliis duabus oppositis ovato-cordatis amplexantibus concavis, acutis patentissimis.

Flores secundi, nutantes, suaveolentes.

Calyx subturbinatus laciniis ciliatis acutis patentibus.

Corolla subovata, calyce duplo longior, leviter angulata, extus glabra, intus pilosula.

Filamenta planiuscula, puberula, brevia. *Antheræ* fuscescentes, erectæ, conniventes, loculis terminatis cornu capillaceo furcato.

Ovarium planum villosum, circumdatum annulo carnoso obsoleto sublobato. *Stylus* columnaris brevis. *Stigma* obtusum.

Observation. This elegant shrub agrees so well with the character and habit of *Gaulteria*, as they have been defined by the celebrated author of the *prodromus floræ Novæ Hollandiæ* (vol. i. 558) that I hesitate not referring it to that genus. Not only the flowers but the leaves also partake of a very aromatic fragrance, which the plant retains a considerable time even after it has been dried; the plant might therefore be used at *Nepal*, as *G. procumbens* is said to be employed in *Canada*, as an improver of inferior sorts of *Tea*. I have not yet had any opportunity of examining its fruit, which I am informed is eat by the Napalese.

Saxifraga ligulata. *Wall.*

Radice carnosa horizontali squamosa, foliis crassis rotundatis s. obovatis brevissimè petiolatis vaginisque ligulatis ciliatis, scapo brevi unibracteato, paniculâ terminali furcatâ, petalis calyce duplo longioribus.

Habitat in montibus Napaliæ et Bengalæ orientalis, florens Januario et Februario.

Nomen Khasianum *Atia Torongsing*. Napalensibus *Schanpe-Soah*.

Radix cylindrica, pollicem circiter crassa, fusca, intus lactissimè rufescens, pedalis et ultra, indivisa, lignoso-carnosa, solida, obsita bracteis (rudimentis vaginarum) magnis nigricantibus irregularibus patentibus emarcidis, deorsum emittens fibras longas teretes subsimplices.

Folia omnia radicalia, plana, terræ incumbentia, obtusissima, indivisa, basi leviter angustata, ad insertionem petioli retusa, crenato-dentata, dentibus crenisque ciliis longis pallidis inæqualibus terminatis, palmaria ad pedalia, uti omnes plantæ partes laevia, carnosa, ad lentem punctata, suprà saturatè viridia, dum juniora purpurascentia, subtus pallida, costâ valde robustâ latâque, nervis prominentibus suboppositis furcatis, ad marginem reticulatis, avenia.

Petiolus valde crassus, cylindricus, lineas duas ad sex longus, insertus dorso vaginæ laxæ membranceæ in ligulam magnam petiolo duplo longiorem erectam bilobam ciliato-barbatam desinentis.

Scapus crassus, cylindricus, rufescens, pedalis, apice semel bisve furcatus.

Bractea ovata, acuta, adnata, ciliata, laxa, pollicaris, infra bifurationem scapi, deciduâ.

Flores magni, albicantes vel rosei, inodori, pedunculati, congesti in paniculam terminalem compactam subracemosam nudam leviter nutantem.

Pedunculi teretes, crassi, rufescentes; *Pedicelli* vix unguiculares.

Calyx ovatus coloratus, profundè quinquefidus; *laciniæ* ovatæ, obtusæ, erectæ, leviter ciliatæ.

Petala subrotundo-ovata, unguicularia, basi in unguem brevem angustata, calyci intus inserta, laciniisque ejus alternantia.

Filamenta subulata, calyci inserta, patentia, quorum quinque petalorum longitudine laciniis calycinis opposita; quinque illis alternantia et breviora, petalis opposita. *Antheræ* ovatæ, erectæ, utrinque longitudinaliter dehiscentes, rubicundæ.

Ovarium superum profundè bipartitum, seu potius ovaria *duo* oblongo-ovata convexa latere interiori plana lineâ longitudinali exsculpta, unilocularia, polysperma. *Ovula* valde numerosa adfixa placentæ oblongæ carnosæ paginæ interiori lineæ istæ longetudinali correspondenti insertæ. *Styli* duo, longitudine filamentorum majorum, crassi semiteretes, divaricato-patentes. *Stigmata* car-

once producing any fruit.*

Blackwellia tomentosa, Vent. which I know only from Poiret's Supplement to the Encycl. botanique. i. 640, seems to be a distinct species from that described above.

Clematis smilacifolia. *Wall.*

Scandens, foliis simplicibus ovato-cordatis, petiolis acirrhatis, racemis axillaribus paucifloris elongatis.

Habitat in montibus Bengalæ orientalis prope Sylhet, ubi vocatur *Boeghandi*; inqve Napalia. Floret initio anni.

Frutex volubilis, ope petiolorum scandens, omnibus partibus glaberrima, ramis gracilibus elongatis sulcatis striatis fuscis articulatis.

Folia opposita, longé petiolata, integerrima, acuta, quinquepollicaria ad palmaria, subcoriacea, quinquenervia, transversim reticulato-venosa.

Petioli teretes, graciles, suprà planiusculi, basi dilatati, longitudine folii, hinc inde torti, absque ullis cirrhis.

Racemi oppositi, foliis duplo triplove longiores, floribus longé-pedunculatis oppositis majusculis.

Pedunculi striati; partiales quadripollicares, patentes.

Bracteæ infra singulum par pedunculorum oppositæ, lanceolatæ, subcuneatæ, semipollicares. Aliæ interdum infra medium singuli pedunculi partialis oppositæ, lineares, recurvatæ.

Perianthii foliola quatvor, patentia, demum reflexa, oblonga, acuta, unguicularia, crassa, extus ferrugineo-villosa, striata, intus glabra violacea.

Petala nulla.

* Since writing this I have received specimens from *Napal* of a tree which, together with that described here, belong to *Homalinae* and probably form two new species of *Astranthus* Lour, as suggested by Mr. Robert Brown in Tuckey's narrative of the expedition to the river *Congo*, Append. p. 438.

[illegible]

[illegible] sordis [illegible] [illegible] [illegible]

[illegible] petiolo [illegible]

[illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] polio [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] 355 [illegible]

[illegible] [illegible] species is sufficiently [illegible] from all [illegible] [illegible] and requires no further detail. Its elegant leaves, [illegible] [illegible] [illegible] perianth, and the numerous yellow stamens [illegible] [illegible] it a very beautiful [illegible].

[illegible]

[illegible] [illegible] scandens, foliis [illegible] [illegible] [illegible] lucidis. MS. [illegible] Roxburgh.

[illegible] *[illegible]-Valli*. Rheed. [illegible] [illegible]

[illegible] [illegible], Rumph. Amb. [illegible] [illegible] [illegible]

[illegible] [illegible], ibid. [illegible] [illegible]

[illegible] [illegible] [illegible] Linn. [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] 70.

[illegible] in [illegible]. [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] Coco [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Habitat [illegible] Malabar [illegible] [illegible], Celebes [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] D.

[illegible] [illegible] [illegible] [illegible] [illegible] volubilis [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] scandens, [illegible], [illegible] [illegible].

Radix crassa, lignosa, ramosa; intus flava, lacunosa; vetustior cortice suberoso obtecta.

Truncus crassus, cylindricus, cortice vestitus suberoso molli rimis plurimis parvis notato cinereo, basi emittens stolones radicantes, plures orgyas longas, apice foliosas, tenellas purpurascentes. *Rami* longissimi, teretes, glabri, sordidè gryfei, pendulì; juniores uti omnes reliquæ partes laevissimi, pallidi, glaucescentes.

Folia sparsa, petiolata, patentia, ramulorum valde approximata, amplissima, dodrantalia et ultra, coriacea, firma, subrotundo-ovata, obtusa v. acutiuscula, apice cum mucrone deciduâ marginèque integerrimo recurvatis, basi leviter cordata, vel subtransversa, semper ad insertionem petioli levissimè emarginata, suprà atroviridia lucida, inter vasa in bullas latas transversales elevata; subtus concava glauca, furfure parco adsperſa, septem-v. quinque-nervia, costâ basi integrâ nervisque extrorsum ramosis valde prominentibus carinatis, venis gracilibus horizontalibus, sinubus vasorum, præcipue axillis nervorum glanduloso excavatis, ad paginam inferiorem folii villorum acervulo notatis, ad superiorem elevatis. Folia adulta, præprimis eorum vasa flavescentia; juniora ovata, acuta, coloris lætissimè viridis.

Petioli graciles, teretes, lignosi, suprà leviter sulcati, folia longitudinem aquantes, juniores duplo et plus breviores, apice incurvâ tumidi, basi valde incrassatâ pollicari varié hinc inde torti, cirrhati.

Stipulæ nullæ, nec earum vestigium.

Inflorescentia foeminea. Racemi oblongi, laxi, penduli, numerosi, 4 v. plures fasciculati, raro solitarii, ex ipso trunco ramisque vetustioribus, pedunculati, compositi, pedales bipedalesque. *Racemuli* sparsi, subsessiles digitum circiter long, cylindrici, patentissimi, nox adscedentes (ratione pedunculi universalis recurvati.)

Pedunculus basi nudus, teres, incrassatus, extrorsum leviter angulosus; partiales graciles, striati: omnes subcarnosi, laeves, lactescentes.

"any thing of the natural character, as our plants have not yet "blossomed."

One of the four individuals alluded to in this extract blossomed for the first time towards the close of 1816, and while I write this (in December of the following year) both that and another female somewhat smaller shrub are covered from the base of the stem along the principal branches with innumerable fascicles of pendulous racemes, which give them a very stately appearance. The smell of the flowers spreads to a great distance and being very powerful is offensive in the immediate vicinity of the shrub, not unlike that of the common *Berberry* and *Lawsonia*. The root is ligneous and very branchy, porous and of a deep yellow colour within, possessing a peculiar, strong and nauseous smell, and like all the tender parts of the plant a bitter taste. The principal branches of the root are covered with a spongy cracked bark. The circumference of the trunk measures at present between fourteen and seventeen inches. The old leaves especially their ribs and nerves are yellowish.

The mistake of POIRET in uniting *Cissampelos Pareira*, *Caapeba* and other plants with *Menispermum Cocculus L.* in the continuation of LAMARCK's Encycl. Botanique, v. p. 9. has been adverted to by the illustrious author of the articles *Menispermum* and *Cissampelos* in REES' new Cyclopædia.—Lamarck (l. c. iv. p. 96.) cites RUMPHIUS' *Tuba baccifera* with some doubt as a variety, or perhaps the female plant only of his *M. tuberculatum* (Roxburgh's *M. verrucosum*, see FLEMING in Asiat. Research; xi. p. 171); and two pages further on, he forms it into a distinct species, which he calls *M. lacunosum*, and which is the same as *M. Cocculus*. I am surprised that neither RHEEDE's nor GAERTNER's works have been quoted under this head. The same great botanist establishes a separate species on RUMPHIUS' *Tuba flava* and calls it *M. flavescens*,

(i. e. p. 97), having previously published, with great propriety, that it comes very near to the *Tacca cadifira*. I am venturing to quote both these plants of Rumphius as synonymes, because though his descriptions of their flowers and fruits seem to differ, they agree perfectly in other respects and the leaves of the latter which is described above, varying from almost orbicular obtuse to ovate-cordate, more or less acute, unite in them the characters of both those plants.

Rumphius's figure of the leaves is a pretty exact representation of those of my plant; and agrees better with the description in the *Herbarium Amboinense* than Rumphius's own plates do, notwithstanding the remark of the last mentioned author to the contrary. I have not been able to identify this plant with the Sanskrit name of it, *Cacámari*, given by Dr. W. Ainslie, in his excellent *Materia medica of Hindostan*, pag. 81; nor have my hopes of succeeding in tracing the name, *Cacámari* in the Sanskrit *Cacchi* and *Kacola* been realized, one of these latter belonging to an unknown bulbous root, the other to an aromatic fruit, which certainly is not that of the plant in question. My worthy friend, the Reverend Dr. William Carey, informs me that one of his pundits, a native of Malabar, to whom he shewed the fruit which I had received of the *Menispermum*, recognised it immediately as being produced in vast abundance on that coast, where it is called *Garalaphala*, or the *poison fruit*, also *Cacámari*, from the circumstance of the natives, especially the Christians who, he says, feed on crows, making use of it to kill them. They bruise the fresh or even unripe seeds and mix them with boiled rice into a paste which is laid about for the crows and infallibly kills all that eats of it. He adds, that a large fruit of another kind, to which the name *Cacámari* is given, is used for the same purpose, but only intoxicates the crows, so that they may easily be killed. I understand

ſtand that theſe ſeeds are employed about Calcutta for catching fiſh and killing crows, but I have only been able to meet with them in a ſingle native ſhop, where they were ſold to me under the name of *Bacain-ka-phal*, probably from their fancied likeneſs with the fruit of a kind of *Melia* (*Melia ſempervirens*, in Sanſcrita *Mahanimba*) which goes by that name. *Cácamari* and *Garala phala* are both legitimate Sanſcrita words, though they are not to be met with in any of the dictionaries or medical writings of the Hindoos conſulted on this occaſion.

Since writing the above Mr. MURDOCH BROWN of *Anjarakandy* has favored me with the following account, in reply to ſeveral queries which I took the liberty to propoſe to him relative to this intereſting ſhrub.

"The *Cocculus Vine* is indigenous in *Malabar* and *Canara*, and "grows in the interior of moſt parts of thoſe provinces, but moſt "luxuriantly in *South Malabar* and *Travancore*. I have never "ſeen it wild within leſs than ten miles of the Sea, though I have "planted it within half a mile, where it grew vigorouſly and pro-"duced fruit. Here (at *Tellicherry*) it grows to an immenſe "ſize, overtopping the higheſt foreſt trees and by its wiry hard "tendrils catches hold of the branches of the adjacent trees and "thus creeps from one to another to an aſtoniſhing diſtance from "the parent root. When in bloſſom all theſe various branches "as well as the parent ſtem are thickly covered with large bunches "or grapes, which afterwards yield a ſurpriſing quantity of the "Berries."

"The natives make no uſe of the roots either in medicine or "for dying, ſo far as I have been able to learn."

"One of the largeſt of my planted Vines, about 15 years old "meaſures 21 inches round at about a foot and a half from the "ground. Laſt year (1817) they began to put forth their flow-

"as on the 15th of September, and all were full of blossoms by "the 10th of October. The flowering branches shoot from the "trunk of the Vine and also from the wood of the large branches. "The flowers are succeeded by small white berries, to the number "of 2 and 300 on a bunch, which continue slowly to increase in "size until the commencement of March, when they begin to ac-"quire a purple colour, not all together, but successively, and fall "off, when they have become of a bright purple, one by one, as "each berry attains maturity. The birds also carry off great "numbers in this state; a circumstance which leads the natives "to gather them before they begin to change colour, and conse-"quently before the kernel has acquired the oily part, which "constitutes its value as a poisonous drug."

"I have never heard that the drug was put to any other use "but that of a vermifuge on black cattle and horses, and for killing "or rather stupifying fish, so as to make them float on the surface "and be easily caught. What is carried from hence to *Arabia* "and *Persia*, is as I have been assured, used for the same purposes. "It is probable that when fresh it would also kill rats and crows; "indeed it is used with that intention in some parts; but having "never seen this done I cannot therefore speak to its effects. In "*Canara* I have met with a kind of wax made of its kernels freed "from their husks, used for burning in Lamp."

"The proper name in *Malabar* is *Nanja Cootas* (Poison Berry), "but it is more generally known to traders and the common peo-"ple by the name of *Polla Key* (light or imperfect fruit) from its "being gathered before maturity, the kernel not having acquired "its proper size to give the Berry weight. In *Canara* it is named "*Garda Phala*, but whether that be the Sanscrit name I cannot "say; *Caca-mari*, or *Kill-crow*, is the *Dukhani* name, and probably "derived from the use that is made of it."

"There is no prohibition to its exportation here ‡ and the "demand is inconsiderable. The Arabs still take away a few "candies (about 670 lbs.) of it annually. The price in England "is so low that it will hardly pay freight, though some years ago "large quantities were sold there at a high price."

Note by the Secretary.

There are several Sanscrit terms familiarly known on this side of India, which might be supposed to refer to the Cocculus indicus, but which on examination prove to have nothing in conformity with it except the sound. That amongst these, the words *Cácoli* and *Caccola* are affixed to very different substances, as is noticed by Dr. Wallich, will perhaps be most satisfactorily shewn by the following account of them, extracted from original authorities.

Cácoli. The Hindus enumerate in their medical works a class of eight substances, which they denominate the *Ashta verga* or class of eight: they are all *roots*, and appear to come chiefly from *Nepal* and the countries skirting the *Himálaya* mountains; their properties are supposed to correspond, and they may be employed either separately or collectively, as remedies in a great variety of morbid conditions; their general virtues are thus detailed: They are cool, sweet, fattening, and aphrodisiac, promotive of digestion, sanative, lactiferous and tonic; they are corrective of the vitiated humors or wind, bile, and blood, curative of fever, and of great efficacy in urinary and phthisical affections. They are severally named *Jiveca, Rishabha Méda, Mahámeda, Cácoli, Cshira Cácoli, Riddhi,* and *Vriddhi*: they are probably tonic medicines of some power and at least merit further investigation: the substance amongst these termed *Cácoli*, is generally connected with the one subsequent to it in the above list, or *Cshira Cácoli*, and they are thus described

‡ Mr. W. Harington, Collector of Customs at Madras informs me, that a very heavy duty has been laid upon the drug, amounting almost to a prohibition.

in the *Bhává Prakáśa*: These [illegible], are procured from *Malwa*, and the adjacent districts. *Ośhira Cácoli* resembles the root of the *Pivári* (*Asparagus racemosus*), and is of a white colour, a fragrant smell, and full of a milky sap. The *Cácoli* is of similar form and character, but of a dark hue. They are both [illegible] and cooling; they remove fever, and correct a vitiated state of the blood and bile: the roots of the *Vidári* (Convulvulus paniculatus) and the *Aśwagandha* (Physalis flexuosa), are severally substituted for the *Cácoli* and *Ośhira cácoli*.

Cacola or *Cacodaca*. This substance is always classed among the perfumes, and forms one of the ingredients in different aromatic compositions, along with agallochum, frankincense, camphor, musk, saffron, spices, and other similar articles. It is procured in the bazar in different degrees of freshness, and is a berry of a more or less irregularly oval form: when freshest it is invested with a thick green sebaceous and fragrant coat, but in a more advanced state, this shrinks so as to be scarcely discernible from the shell, which is of a greyish colour; in either state the centre is filled with a resinous inflammable substance, of a strong and spicy odour, soluble but very sparingly in water, and more abundantly in spirit. The history of this substance is not given in any of the medical works I have consulted, nor are its character and origin known to any of the native Druggists, although used by them in many of their compounds. It appears sometimes to be confounded with *Cinet*, and it is called so, or *Chatafi* by the author of the *Sabda Chandrika*, a medical vocabulary in Sanscrit with a Bengali translation: if this be not an error of the author or translator, the berry sold by the druggists cannot be the true *Cacola*, but I much doubt the accuracy of the interpretation: the synonymes will all apply to either substance, though they require to be translated out of a metaphorical phraseology: the names given in the *Sabda Chan-*

Brica are *Cacoli*, *Cólaca*, *Gandhamyfcula*, *Tailafadhana*, *Caccolaca* and *Cofhaphala* of which the two first and fourth, though anomalous formations, appear to relate to the *Cola* or fruit of the Jujube, to which the *Caccola* berry may be compared in appearance; *Gandhamyfcula* means diftreffingly-oderiferous; *Tailafadhana* either the purifier of oil, or that of which oil is the folvent, and it may be obferved that civet is moft readily foluble in that menftruum; the laft term *Cofha phalam*, may be rendered the fruit of the fcrotum or fheathe, referring either to the part of the animal whence it is extracted, or to the fort of coat by which the berry is invefted. The *Rája Nighanta* and *Bhâva Pracafa* defcribe the medical properties of *Cacóla*, and ftate it to be pungent, bitter, warm, and carminative, fweetening the breath, relieving heartburn, exciting appetite and promoting digeftion, and remedying morbid affections of wind and phlegm: neither this nor *Cácoli* therefore are confidered as poifonous, nor can they be confounded with the Cocculus indicus.

The only remaining word which may imply the fruit of the Cocculus vine is to be found in the vocabularies of *Amara* and *Hémachandra*, amongft the different kinds of poifon: no defcription however accompanies the name, nor have the different commentators on *Amara* fupplied this deficiency, nor illuftrated the nature or origin of the fubftance, by etymological analyfis. The word is *Cácola*; it implies a poifon, not of animal origin, and is derived according to *Raya Mucuta* from the fame word *Cácola*, a *raven*, from its being of the like dark colour: in this it corresponds fufficiently well with the hue that the Cocculus berry is mentioned by Mr. Brown to acquire when ripe, and being fimilar to it in its poifonous property, as well in its appellation, it is poffible that in this word we have the *Sanfcrit* origin of the name given by European writers to the fruit of the Menifpermum Cocculus.

REFERENCE TO THE PLATES.

I.

Brunella prolifera.

a. peduncle and bracts with the calyx opened;

b. corollas;

c. fruit bearing vessel.

Gerardiana oppositifolia.

a. flower,

b. ditto opened;

c. pistillum;

d. sections of ovarium;

e. berry;

f. g. sections of the same;

h. seed;

i. g. sections of the same shewing the embryo.

C. cirrhifolia.

a. b, leaves viewed from both surfaces;

c. flower,

d. ditto opened.

Daphne involucrata.

(The letters in this plate have by mistake been engraved as capitals).

a. flower;

b. ditto opened;

c. pistillum;

d. the same with the ovarium opened.

D. cannabina, Lour.

(Two plates; the last struck off on the common sort of paper manufactured from the bark of that shrub in Napal.)

a. peduncle with the common receptacle and two detached bracts;

b. flower;
c. the same opened;
d. pistillum, with its hypogynous annular membrane opened;
e. drupe with part of the withered perianthium attached to its base;
f. g. sections of the fruit;
i. embryo;
k. cotyledons.

D. Gardneri.
a. flower;
b. ditto opened;
c. peduncle and receptacle, with a detached bracte;
d. pistillum;
e. the same, shewing the pendulous ovalum.

Andromeda lanceolata.
a. flower;
b. calyx opened;
c. corolla, opened;
D. ovarium divided horizontally.

A. ovalifolia.
a. flower;
d. ditto, the corolla removed;
b. corolla opened;
c. stamina (augmented).

Gaultheria fragrantissima.
a. flower;
b. peduncle and bractes;
c. calyx and pistillum;
d. corolla, opened;
e. stamen (augmented)

Saxifraga ligulata.

a. flower;
b. ditto opened;
c. pirtilla;
d. one of them somewhat enlarged;
e. ovarium divided horizontally.

Blackwellia spiralis.

a. b, flower viewed from two sides, with a detached bracte;
c. pistillum, shewing the insertion of the ovula; all slightly augmented.

Minispermum Cocculus. (Two plates.)

a. partial raceme, natural size;
b. flower,
c. ditto with its detached leaflets;
d. peduncle, all the parts of the flower removed except the nectarial scales;
e. pistilla;
f. ovaria cut horizontally;
g. ditto divided longitudinally;

[illegible] of two species of [illegible] found in the [illegible] of Mashalo [illegible] Major Parquharson — Communicated by the Honorable A. SETON.

Letter from Major Parquharson to [illegible]

My dear Sir,

[illegible] thing that the [illegible] varying according [illegible] the Tsetse fly, found in the forests in the [illegible] which [illegible] been [illegible] generally known to [illegible] may prove interesting. I have [illegible] to the purpose (though [illegible] public [illegible]) of being [illegible] have [illegible] the pleasure to [illegible] [illegible] animal [illegible] dreams are [illegible] of [illegible] singular [illegible]

[illegible]

My [illegible]

[illegible]

[illegible]

Class Mammalia, order Belluæ.

Generic character.

Seven grinders on each side in the upper jaw.

Six ditto ditto in the under jaw.

Four Cutting-teeth exclusive of tusks in the upper jaw.

Six ditto ditto (four large and two small) teeth in the under jaw.

Two Tusks (or Canine-teeth) on each side in the upper jaw, short, distant, obliquely truncate, slightly recurvated, back ones much smaller than those contiguous to the front teeth.

One tusk on each side in the under jaw more pointed and prominent than those in the upper jaw.

In all twenty-two teeth in the upper, and twenty in the under jaw.

A vacant space of two inches between the grinders and tusks in each jaw, *upper* jaw projecting about half an inch over the under, and having a thin heart-shaped bone, four inches long, jutting out from the lower part of the forehead directly over the cavity of the nose.

The skull forming a sort of ridge at top.

The back arched.

The fore feet divided into four hoofs the hind feet into three.

The nose of the male extending beyond the lower jaw, between seven and eight inches, forming a snout or proboscis, extensible and flexible.

but as a variety of the same genus of quadrupeds. The principal difference will be found to consist in the number of teeth and tusks; the TAPIR in *America* according to LINNÆUS has only ten grinders in each jaw, and is without tusks; whilst that of *Malacca* has fourteen grinding teeth and four tusks in the lower jaw. LINNÆUS gives likewise to the *American* TAPIR ten fore-teeth in each jaw, whereas the *Malacca* TAPIR has only four in the upper, and six in the lower jaw exclusive of the tusks. Some other naturalists however allow the *American* TAPIR to have tusks, single and incurvated. In every other respect the *Malacca* and *American* TAPIR will I fancy, be found to correspond very nearly, and particularly in that distinguishing character of the proboscis, or snout, which over-hangs the lower jaw, from seven to eight inches, extensible and flexible, like that of the elephant and common only to the male.

The manner in which the feet are divided is likewise very peculiar; and is the same in both animals; having four hoofs in the fore, and only three in the hind feet. The general size and shape of the TAPIR of the old and new world will be found nearly alike, but differing in color; the head of this animal is of a singular shape, and forms a sort of ridge at top, the eyes are small, ears roundish and bounded with white, which can be drawn forward at pleasure, the legs are short and very stout, the body large, and in shape somewhat resembling that of the hog. The neck is short and thick, and the skin strong and coarse, like that of the buffallo. The hair is short, and of a black colour, from the proboscis to the extremity of the four quarters; The body and part of the hind quarters of a light grey, and the rest of the hinder parts and legs are black. The tail is very short, and almost destitute of hair; It has no mane on the neck, in which respect it seems likewise to differ from the *American* TAPIR;

[illegible] beautifully shaded with bro[illegible]
[illegible] of Malacca is not known [illegible] an
[illegible] animal, it is perfectly harmless [illegible]
[illegible]. Indeed it seems destitute of any natural [illegible] of offence
or defence. It feeds on vegetables, and is said to be par[illegible]
[illegible] of sugar-cane. Its flesh is eaten by the natives ([illegible]
the exception of Mahommedans, who deem it unclean) and [illegible]
[illegible] good. None of these animals have as yet been do[illegible]
[illegible] Malacca, but it have no doubt if taken young,
they might be tamed with equal facility as those of *America*.

The drawing which accompanies this will be found a faithful representation of the *Malacca* TAPIR. It is taken from life, and will convey a much better idea of the animal than any description I am able to give.

It is [illegible] very possible that the *Malacca* TAPIR may be found to correspond more closely with one of the two fossile species described by Cuvier, in his geological discoveries; as having been met with in different parts of *France*, *Germany*, and *Italy*, the one named [illegible] the other the gigantic TAPIR.

It may be proper to mark that the foregoing dimensions were taken from a TAPIR, which had not attained its full size; it being the head of a full grown one now by me which measures two inches more in circumference than the above.

Additional observations by the SECRETARY.

The difficulty of the presence of an animal in the eastern hemisphere, which has been hitherto supposed peculiar to the new world, is a circumstance that deserves the fullest illustration which

the Society can bestow upon it: and it has therefore been deemed advisable, to publish the following additions to the valuable communication of Major Farquhar: the first of these, from the pen of a distinguished pupil of our illustrious associate M. Cuvier, shews satisfactorily, that the animal discovered by Major Farquhar is essentially the same as the Tapir of *South America*, and the second from G. J. Siddons Esq. late Resident at *Bencoolen*, presenting to the Society a living animal of this description, informs us of a fact, which is equally interesting in a geological and zoological view, and proves that the existence of the oriental Tapir is not limited to the Peninsula of *Malacca*.

Observations by M. Diard, *on the* Tapir *of Malacca.*

When an error has originated with a distinguished writer it passes long current under his sanction, and is slowly and reluctantly corrected; it is to this circumstance we must attribute the repetition by Linnæus, Buffon, Shaw, and other eminent naturalists, of the mistake committed by Marcgrave, when he first gave a scientific description of the Tapir of *South America*, and who has erroneously asserted, that the animal had but twenty teeth in each jaw; or ten *molares*, ten *incisores*, and no *dentes canini*: it is not easy to conceive how Marcgrave, in general so exact, and who had so many opportunities in the *Brazils*, of examining the living animal, should have fallen into such an error, for the Tapir of *America* has in the upper jaw six grinders, two canine, and six cutting teeth, and in the lower jaw but six grinders, with the same number of canine and cutting teeth as

the upper, making in the whole forty-two teeth; and upon the most careful examination of the skull of the TAPIR of *Malacca*, deposited in the SOCIETY's Museum, I can confidently affert that the teeth agree in number, form, and proportion, precisely with those of the *American* TAPIR. In the upper jaw there is an imperfect evolution of the two canine teeth, and the two outer incisors have all the appearance of tusks, and this accounts for the error in the description, which the excellent naturalist, who has enriched zoology with so important a discovery, has committed; the same mistake has indeed been lately made, with respect to TAPIR of *America* by the learned FELIX D'AZZARA, and it is one of very natural occurrence, as the two outer incisors have the character of tusks, and the more so, from being much more prominent than the true canine teeth; they are easily however distinguished, by the cultivator of comparative anatomy, by their insertion in the bone peculiar to the *incisors*, (*os incisf*); an articulation that would leave no doubt of their real character, even in the entire absence of the *dentes canini*, and a proof of the value of a science, which determines the nature of parts, by the immutable laws of anatomical position, and not by the uncertain, and varying test of external appearance.

The identity of the TAPIR of *Malacca*, with that of *South America* makes it of course a different animal, from the small fossile species, described by M. CUVIER, as that has been shewn to differ widely from the *American* animal, both in the dentition, and in the conformation of many parts of the maxillary bone.

For the correct number and accurate nature of the teeth of the *American Tapir*, natural science is indebted to MESSRS. GEOFFROY ST. HILLAIRE and CUVIER. To Major FARQUHAR alone belongs the honor of having first given, with the trifling exception I have noticed, a correct description of the interesting animal which

forms the subject of these observations.

I have only to add, that the young male TAPIR which is in the menagerie at *Barackpore*, is in all respects the same, with that described by Major FARQUHAR.

Letter from G. J. SIDDONS *Esq. to the* SECRETARY *to the* ASIATIC SOCIETY.

Sir,

I have sent on board the Ship Claudine, commanded by Captain WELSH, a very rare animal called on this Coast the *Tannoh*, which I beg you to present to the Asiatic Society in my name.

It resembles, with extreme closeness the TAPIR of BUFFON. It was presented to me by the *Pangeran* of *Soongye Lamoro*, who informed me that it was taught in a paddy plantation upon his lands in the interior. Search was made for its parents, but no traces of them were discovered: the people were attracted by the shrill cry of the animal, which they found at the edge of the paddy ground, close to a thicket, amidst very long grass, the *Pangeran* himself is, perhaps, the oldest man living in these districts: He says that he never saw but one other animal of this description, which was when he was about ten years old, and that he has never heard of one having been seen since, that which he then saw was of the size of a small cow.

The *Tannoh* eats boiled rice, after it has got cool, grass, leaves &c. It is of a very lazy habit, but perfectly gentle, and loves to bathe, (remaining a very considerable time under water) and to be rubbed or scratched, which he solicits by throwing

himself down on his side. He has been in my possession almost three months, during which period he has grown considerably, and his skin has changed from a dusky brown, streaked and spotted with white, to its present appearance.

I trust the animal will reach *Calcutta* alive, when no doubt it will gratify the curious in natural history.

I remain

Sir,

Your very obedient servant,

SUMATRA,
Fort Marlborough
6th Dec. 1816.

C. J. SIDDONS.

The animal described in the letter from Mr. SIDDONS, is the one alluded to by M. DIARD, and is still living in the menagerie at *Barackpore*; Its habits continue of the gentle and indolent character mentioned in the preceding communication, and it agrees with Major FARQUHAR's description in every respect, except in its evincing a great fondness for water: it constantly seeks a pool in which it remains immersed the greater part of the day; and not unfrequently dives for a very considerable period, presenting in this respect another analogy to the TAPIR of *South America*.

The following measurements have been recently made of its dimensions.

	f.	in.
Extreme length from the point of the proboscis to the tip of the tail,	7	6
Length of the proboscis,		5
Ditto, head,	1	6
Ditto, neck,		

Ditto,	body,	4
Ditto,	tail,	2
Height at the shoulder,		2 9
Ditto, middle of the body,		3 1
Ditto,	rump,	2
Ditto,	fore legs,	1 8
Ditto,	hind legs,	1 5
Circumference of the body,		5 4
Ditto,	neck,	2 8
Ditto,	head,	2 10
Ditto,	proboscis, about	7

The following description of a young animal, received subsequently from Major FARQUHAR, with some other interesting communications on subjects of natural history, will complete the information we at present possess regarding the *oriental* TAPIR.

The drawing which accompanies the following account of a young TAPIR, and which I have the pleasure of offering to the acceptance of the ASIATIC SOCIETY, was taken from an animal about four months old, and represents it as of a reddish brown colour, studded with white spots. It was taken from one I had alive in the house. After it has passed the above period, it begins gradually to change colour until the age of six months, by which time it has lost all its beautiful spots, and attained the general color of the full grown TAPIR as represented in a drawing I transmitted from hence to the ASIATIC SOCIETY in the beginning of last year. The TAPIR from which the present drawing was made, I preserved alive in the house for upwards of six months, when it died suddenly. I found it an animal possessed of a most mild and gentle disposition. It became as tame and familiar as any of the dogs about the house, fed indiscriminately on all kinds of vegetables; and was very fond of attending at table to receive

bread, cakes, or the like. It seemed very susceptible of cold, notwithstanding the great thickness of its skin, and I think I may venture with great safety to affirm that the TARK of *Malacca* has nothing amphibious in its nature, a character which appears to attach to those of America; indeed the one I reared shewed rather an aversion to water, and in the wild state they are found to frequent high grounds.

XII.

An Account of a new Species of a CAMELLIA *growing wild at Nepal.* By N. WALLICH *Esq. Superintendent of the Botanic Garden, Calcutta.*

Read December 18, 1818.

AMONG the numerous valuable additions which the Botanic Garden at Calcutta owes to the indefatigable and successful researches of the Honorable Mr. GARDNER, are specimens in full blossoms, plants and ripe fruits of the genuine Tea shrub and its nearly allied neighbour, the *Camellia*. Of the former of these, he informs me, there is only one shrub at *Kaimandu*, growing in the garden of a Cashmeeree, where it was originally introduced from *China* while a young plant. It has attained a height of 9 or 10 feet, is rather tall than bushy being of no great circumference in its branches or stem, but thriving exceedingly well, producing abundance of blossoms and ripe capsules annually, from September to November. Most of the offsets which Mr. GARDNER has caused to be taken from it have unfortunately failed after continuing very vigorous for some time after they had been put in the ground, but as the attempt will be repeated I doubt not, that both the Tea-shrub, and the equally interesting *Nepal Camellia*, will before long be introduced into such parts

the Northern Hindoostan, as they appear best calculated to their successful cultivation. The tree which is the subject of the present enquiry was discovered by Mr. GARDNER on the mountains of *Sheopore* and *Chandra Giri*, which form the boundaries of the Valley of *Katmandu* on the North and South, and have been noticed in KIRKPATRICK's account of *Napal*. It grows to a considerable size throwing out numerous leafy branches, and producing blossoms during the rainy season, that is from July to October, succeeded by abundance of fruit which ripen in the course of three months. Notwithstanding the conspicuous oiliness of its seeds, the tree does not seem to be used by the natives for any purpose but that of fuel. Mr. GARDNER remarks with great justice, that it is so like the genuine Tea both in its leaves and blossoms, as to be easily mistaken for it; the very same observation has been made by Chevalier THUNBERG in his *flora japonica*, in speaking of his *Camellia Sasanqua*, a circumstance which corroborates the affinity which exists between these two species. I consider them however as sufficiently distinct from each other, and shall conclude my description of the *Napal* tree, which I propose calling *Camellia Kissi*, the *Newar* name being *Kissi* or *Kissi-joak* by enumerating the points on which their specific difference appears to me to rest. Mr. GARDNER informs me that, like those of the *Sasanqua*, its leaves acquire on being dried the peculiar fragrance of Tea; and that he intends trying them as an improver of and substitute for the latter, in the manner in which Professor THUNBERG informs us that his tree is used in *Japan*.

Camellia Kissi, *Wall.*

Foliis ovato-oblongis, attenuato-acuminatis, acute serrulatis basi integerrimis, petiolis ramulique novellis villosulis; floribus axillaribus terminalibusque subternis, stylo brevissimo stigmatibus elongatis

capsulis trivalvibus trispermis glabris.

Arbor ramosissima, umbrosa, cortice ramulorum cinerascente, novellorum petiolisque villosis.—*Folia* alterna, patentia, approximata, coriacea, ovata, v. ovato-oblonga, tripollicaria, sesquipollicem lata, interdum majora, acumine semipollicari, margine convexiusculo, exceptâ basi acutâ, serrulato, laevia, suprâ atroviridia lucida, subtus pallida, costâ elevatâ, nervisque obsoletis obliquis ad peripheriam anastamosantibus.—*Petioli* planiusculi, sulco lato exarati, vix ultra lineas duas longi.—*Flores* albi terni, nunc in axillis solitarii v. terminales geminati, sessiles.—*Calyx* octophyllus, caducus, aestivatione gemmaceus conicus semipollicaris, foliolis ovatis imbricatis concavis coriaceis fuscescentibus obtusis cum cuspidulâ minutâ, ad apicem leviter sericeis, exterioribus minoribus.—*Petala* obovata, retusa, patentissima, basi angustata, semipollicaria, dorso parum sericea.—*Stamina* octoginta v. plura, petalis parum breviora, cumque illis patentia, filamentis crassis duplici vel triplici serie ad basin connata in annulum angustum pallidè aurantiacum ovario breviorem.—*Antheræ* complanato-ovatæ, disco carnosæ, utrinque dehiscentes, biloculares.—*Ovarium* subrotundum obsoletè triangulare, villis densis sericeis vestitum, triloculare: ovulis in singulo loculo sex v. pluribus axi insertis.—*Stylus* crassus, brevis, villosus.—*Stigmata* tria filamenta subæquantia, patentia, clavata, intus sulcata, apice papillosa.—*Capsula* rotundato-triangularis, pollicaris, lignoso-coriacea, trilocularis, nunc bilocularis, trivalvis, valvis lato-ovatis, apice incrassatis marginibus truncatis latis; extus fusca subnigricans, glabra; immatura pubescens.—*Dissepimenta* membranacea, contraria, nunc incompleta v. subobliterata.—*Semina* solitaria grandia, nucamentacea, fusca, gibbosoconvexa, intus planiuscula vertice umbilico parvo notata; unicum reliquis sæpius majus; uno duobusve nunc abortientibus.—*Integumentum* duplex: externum

and the scales which cover it are somewhat of a square form, and so disposed as to resemble in some degree those of a fish; they are all marked by an abrupt middle carina—the scales on the body are chiefly hexagonal, and are carinated in the same manner, those on the head large and angular; along the lower part of the abdomen runs a pretty strongly marked carina, the scales being not dilated into any appearance of scuta, but merely marked by a middle line of division on the very edge of the carina; the vent is surrounded by a row of large strong lengthened scales.

The *hydrus major* is entirely a marine species, it is furnished on each side the upper jaw with a row of small teeth, one of which (two in those examined at *Madras*) is much larger than the rest, and on being examined is evidently tubular.

HYDRUS GRACILIS.

H. Corpore anterius gracillimo squamis ovatis lævibus, posterius crassiore squamis hexagonis abrupte truncatis.

Length about two feet, head very small, and covered with large scales; neck and fore part of the body very slender and cylindric for the distance of about seven inches when it begins to enlarge, and flatten into a carina on the upper part which is continued to the end of the tail. The slender part above mentioned is covered with ovate smooth scales, the remainder of the animal with hexagonal ones, each marked with an abrupt central carina. The tail is about an inch and three quarters long, flat, and obtusely acuminated, but not so broad as the thickest part of the body.

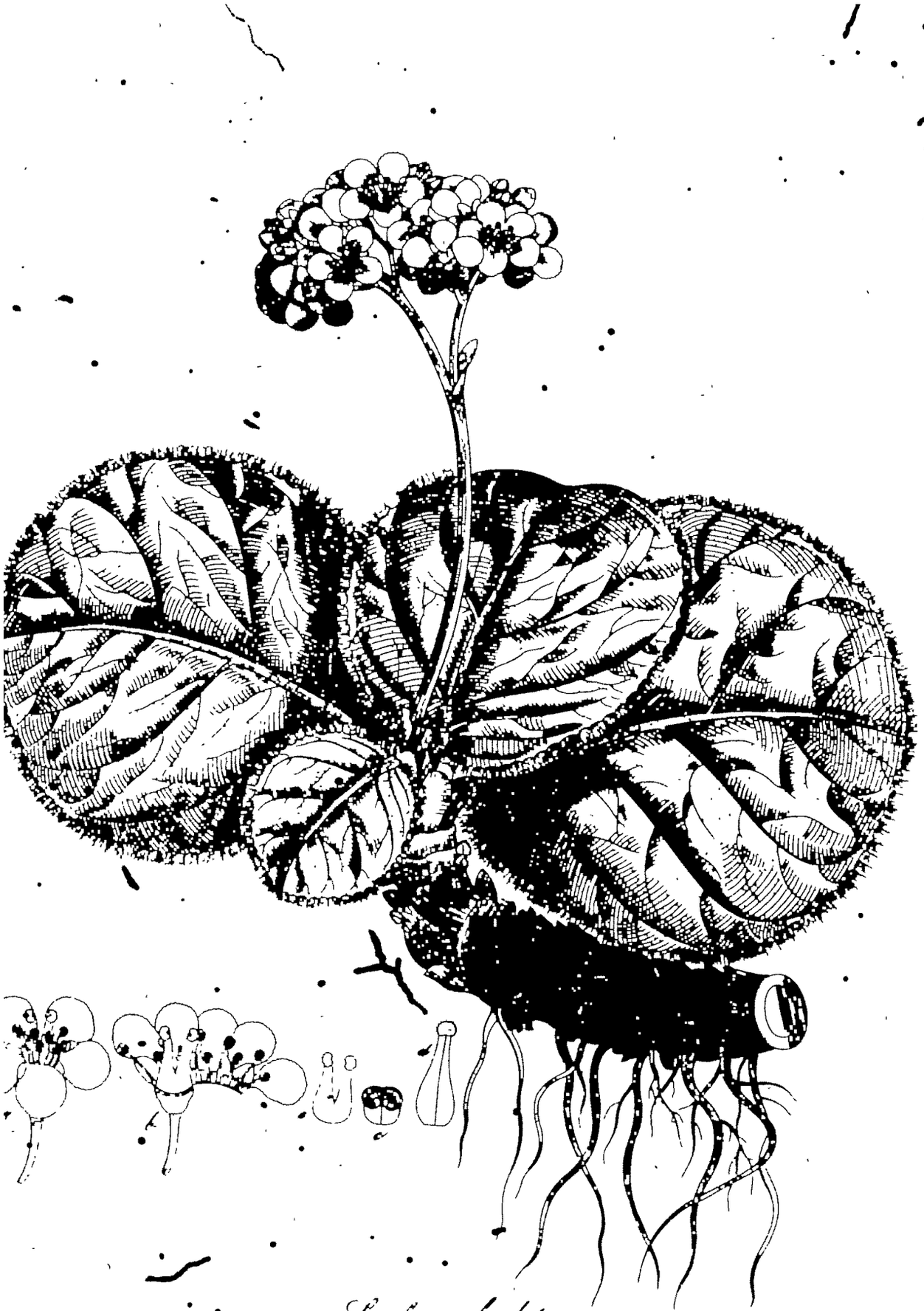
The body is banded all along from the head to the tail, with numerous, equidistant dark and somewhat obtusely pointed bands, reaching almost to the abdomen, which with the intermediate spaces is of a pale

brown colour; those on the cylindric part of the body are nearly annular; the stricture or contraction at the vent is not so strongly marked as in the Hydrus major; to which in some particulars this species seems allied.

The head and mouth of the Hydrus gracilis examined at the Mint being very small, the existence of tubular fangs could not be satisfactorily ascertained, but from the carinated scales added to its other characteristics, there can be but little doubt entertained of their existence.

CASE I.

About three P. M. on the—of November, a native woman in crossing near the land custom house was seen whilst stepping out of the water to shake off something which grasped her foot, and which to several people who were looking on appeared distinctly to be a water snake, the woman after having advanced a few paces from the river fell down, and was carried to the *Pandaul* in a state of apparent insensibility: on examining her feet, two small but distinct wounds were formed on the ankle of the right leg, her skin was cold, her face livid, she breathed with great difficulty and with an occasional hiccup and her pulse at the temple or wrists was scarcely to be felt: a ligature was immediately applied above the wound previously enlarged with a lancet, and to which a piece of the carbonate of ammonia well moistened with the pure nitric acid had been applied; thirty drops of the Eau-de-luce in a glass of water were administered nearly at the same time that the other means were taken: in five minutes more a similar dose was poured down her throat; this last seemed rather to encrease the spasm at the chest, but the pulse now was felt feebly, though distinctly at the wrist—the third dose was repeated in three minutes more, and upon swallowing it, she screamed and evidently breathed more freely.



Saxifraga ligulata

Ravenet Sc.

XIII.

An Account of BIJAPUR *in* 1811, *by Capt.* G. SYDENHAM, *of the Madras Establishment. Communicated by Col.* C. MACKENZIE.

THERE is perhaps no place in *India* less known, and more worthy of being known, to Europeans, than *Bijapur*. Few have been this City, and still fewer have described it. The account of TAVERNIER, the first European traveller of note who visited it, and who was there, it appears, in 1548 A. D. is strangely inaccurate. This authority is followed by THEVENOT, who had not the means of ascertaining its truth by personal observation. Both describe *Bijapur*, as a City exhibiting nothing remarkable but crocodiles in the ditch which surrounds it. Had BERNIER, the most intelligent and correct of all the writers of that period upon *India*, seen *Bijapur*, he would have vindicated it from the misrepresentations of his predecessors: and most probably have associated with the Cities of *Delhi* and *Agra*, of which he has given so faithful and interesting a delineation, the capital of the ADIL SHAHI dynasty (a). ORME, in his fragments, laments the want of information respecting *Bijapur*; and we are indebted to Major MOOR (b), for having detected and exposed the inaccuracies

(a) See SCOTT's History of the *Dekkan*, vol. ii. p. 207.

(b) Narrative of the Operations of Captain LITTLE's Detachment, p. 810.

which had for more than a century involved in obscurity one of the most splendid Cities in *India*; and for having brought to light its hidden beauties, in a faithful description of them written in 1784. Sir JAMES MACKINTOSH visited *Bijapúr* in 1808, and emphatically termed it the *Palmyra* of the *Dekkan*. The following account is drawn from an attentive survey of this City, in 1811.

THE objects which attract particular notice at *Bijapúr*, are classed in this imperfect sketch, in the following order:

1st The Fort and Inner Citadel;
2d The remains of the City,
3d The principal edifices and public works within the Fort,
4th Those outside of it,
5th and lastly, a few cursory remarks will be offered on the history of the place, and on its present state.

1st. THE wall of the Fort was completed by ALÍ ÂADIL SHÂH in the year 1566 A. D. (c). Its defences consist in a rampart flanked by 109 towers of different dimensions, a ditch and covert-way surrounding it, and a Citadel in the interior.

THESE works are very strongly built; and still in tolerable repair; their exterior and interior revetments are of hewn stone, laid in *chunam*. The parapets are composed entirely of the same materials; and are 9 feet in height, and 3 feet in thickness. The towers are in general semi-circular, with a radius of about 36 feet. The curtains appear to rise from the bottom of the ditch, and vary from 30 to 40 feet in height, being about 24 feet in thickness. The ditch is in many parts filled up, and so covered with vegetation, that not a vestige of

(c) Scott's History of *Dekkan* vol. 1. p. 299.

It appears. In other parts it seems to have been forced through rock in breadth from 40 to 50 feet and about 18 in depth, and [illegible] counterforts differently in many places, and [illegible] of a [illegible] turning in a parallel direction at [illegible] front of this point out the [illegible] vert-way. The circumference of the counterforts [illegible] and the form of the Fort an irregular circle.

The works of the Citadel (c) are composed of [illegible] and [illegible] rampart and [illegible] flanked by towers and [illegible] feet in breadth; the space between the rampart and the wall of the main river is very broad, [illegible] of the body of the place are [illegible] being about 3 furlongs in length on the north face. The circumference of the counterforts of the [illegible] is [illegible] furlongs. Its water is good, and contains abundance of the fish, but no alligators, as has been found by former writers. [illegible] entrance into the place, which is through [illegible] of their called the iron gate, is of wood [illegible]

The Citadel is said to have been built by [illegible] Ahmed [illegible] founder of the dynasty of *Siyapar*, and afterwards improved by his successors.

Lastly, [illegible] of the fortress the ruins of a [illegible] extensive City. To trace its limits would be a [illegible] work. It is [illegible] a [illegible] mass of ruins [illegible] the impracticable [illegible]

(a) *Kilometres.*

(c) [illegible] of the Fort and [illegible] Major [illegible] Engineers, kindly communicated by Colonel [illegible], Secretary to Government.

ACCOUNT OF

[illegible] extensive and elegant edifices of the Mahomedan [illegible] which [illegible] have been one of the greatest cities [illegible] was [illegible] divided into several parts or quarters. One of these *Bab pore* is about 6 miles in circumference, and is said to have contained [illegible] hundred thousand dwellings. It has [illegible] and Fort, and being that part of the City which [illegible] the remains of its walls and towers are [illegible] conspicuous, and distinguished by several monuments of ancient grandeur, [illegible] contempt and defied the havock of time. To the south west [illegible] *Ibrahim pore*. To the [illegible] there are [illegible] buildings [illegible] the [illegible] once excelling that part [illegible] Fort, [illegible] has been repaired and [illegible] the residence *Peshwa* [illegible] the south-western extremity of the City [illegible] a town called *Tarad* about two miles from [illegible] which there are many buildings worth seeing.

The most conspicuous object within the Fort [illegible] called Sultan Muhammed [illegible] all independent towers [illegible] dynasty. The lately building is 70 feet square [illegible] and including the dome upwards of 200 feet high. The [illegible] of this [illegible] 120 (2) feet; [illegible] 9 feet, and as [illegible] perpendicular. The perpendicular height is of course 6[illegible] feet. The height and [illegible] has been estimated at [illegible] feet, but [illegible] the run of the building, I found that the diameter of the outer circle was equal to the length of the building, [illegible] by subtracting [illegible] of the dome, [illegible] chained. There is a circular ledge [illegible]

[illegible]

Daphne tamnalina Lour ?

[illegible] into the area of the building from the [illegible] of the inner circumference of the dome, [illegible] and upon supports reclining inwards on the side walls in graceful curves, that it does not apparently [illegible] the middle of the room [illegible] rather an ornament to it. It cannot be [illegible] the same relief and effect [illegible] found any way to work [illegible] the cupola and on [illegible] the extra [illegible] so perfect that I could [illegible] it the voice of [illegible] in mimicking one. The tomb of the founder was [illegible] wooden [illegible] in the centre of the [illegible] in form of a quite [illegible] square and raised [illegible] above the floor. On the [illegible] of the Sultan's tomb, as you enter, are the tombs of his son and daughter-in-law; on the left, the tomb of a favorite [illegible], his daughter and his wife. Over a low doorway, through which you [illegible] to the southern tomb, are four Arabic inscriptions in [illegible] sculptured in the relief. The [illegible] are gilded, and the ground is painted with a liquid preparation of lapis lazuli which gives the whole an appearance of [illegible] of gold and enamel. All the inscriptions which I have occasion to mention are sculptured and ornamental letters [illegible] are being disposed in all varieties of shape and [illegible] very elegant effect. They are said to be all extracts from the Koran, but the letters are so entwined and interwoven with each other, that the quickest reader of this hand would find some difficulty in decyphering them. I was, however, successful in discovering a Persian inscription here, which is a chronogram on the death of Sultan Mohammed. The line is [illegible] "The end of Mohammed was happy," and the date answering to it is 1000 Hijri. (h) On the outside of the face is suspended from the top of the building

(h) A. D. 1591.

This ornament is composed of a chequered [illegible] of very small [illegible] painted alternately with blue and yellow co[illegible] [illegible] by [illegible] the continuity of which is relieved in the centre of each [illegible] by ornaments, in which there is a more graceful and variegated position of the tiles. Over the arches which face the *cibà* or [illegible] and above the band, are three illuminated inscription in [illegible] The side inscriptions are immediately above the side [illegible] in Arabic characters disposed in a circular form. The central [illegible]ment, which is above the centre area, partakes more of the form [illegible] a narrow oval, and contains the following inscription [illegible] letters الله محمد ابو بكر عمر عثمان حيدر (i. e. Allah, Muhammed, Abubacr, Omar, Osman, Hyder, (i. e. Ali) (k) by which we find that Sultán Muhammed, by whose order all the ornaments in the mosque were executed, was a *Sunni* (l) though all his predecessors except the last, were of the *Shiah* (m) sect. The recess itself is most richly decorated with a profusion of gilt and enamel, and covered with beautiful inscriptions, all in Arabic, with the exception of a stanza in Persian, on the instability of this life, and this chronogram, بنای مسجد سلطان عاقبت محمود "the building of the mosque of the Sultán whose end was happy" which makes the date of the completion of the mosque to be 991 Hijrí. (n) The whole of the building is raised upon a terrace about 15 feet from the ground, which has vaults underneath it. The height of the top of the dome from the surface of the ground is 140 feet. The outside of the building presents a double arcade in each face: the lower one is closed, but the upper row is open, and constitutes the front of a spacious gal-

(i) A large ornamental character in arabic writing.

(k) The name of the prophet and his four immediate successors, in the order in which they succeeded to the *khalifat*.

(l) Orthodox.

(m) The principal sect of Dissenters. A full account of both sects is contained in D'Ohsson's Tableau de l'Empire Ottoman.

(n) A. D. 1583.

[illegible] profusion on [illegible] [illegible] founded [illegible] [illegible] was [illegible] by his [illegible] [illegible] of [illegible] extended [illegible] reign of [illegible] [illegible] number [illegible]

founded by [illegible], who also built the [illegible] and the gateway [illegible] the [illegible] the floor [illegible] divided into more [illegible] two [illegible] [illegible] partitions marked by black lines [illegible] [illegible] carried [illegible] [illegible] to the end of which [illegible] a large ruby [illegible] [illegible] [illegible] me, [illegible] [illegible] to the surface [illegible] He also took [illegible] [illegible] which [illegible] covered [illegible] was [illegible] into [illegible] to his troops. This account [illegible] [illegible] was not [illegible] [illegible] except [illegible] of its [illegible] [illegible] of a [illegible] to cloak [illegible] army to maintain who [illegible] [illegible] probably as [illegible] of [illegible] of the West have done of plundering [illegible]

[illegible] in order to the above building [illegible] [illegible] was [illegible] by [illegible] terrace 15 feet high and upwards of [illegible] each face are [illegible] too high and [illegible] [illegible] rows of [illegible] when [illegible] died, and the [illegible] It is said that [illegible] [illegible] built [illegible] of [illegible]

the centre of which was to have been a [illegible] and height of the building, which had it been finished would have been a more stupendous work than the Mahometan Mosque. But even in its present state, it is a grand object, and from the [illegible] of the arches has a striking resemblance at a distance to a splendid structure in ruins.

SECANDER the last sovereign of this dynasty, who yielded Fort and his person to AURENGZEB, lies under, a mean tomb-stone like that of TAHAR-SHAH (o) at *Bidzer*, and the sepulchres of both these royal captives afford a melancholy exemplification of the instability of human greatness. Near this building are the *Taj Bauli*, a well curious Well constructed by SENED-U-MULC, an eunuch of IBRAHIM's court, the tombs of ABDUL FAZL, and his son, celebrated *poets* in his reign, the sepulchre of AURENGZEB's daughter (queen, he says, [illegible]). The grates and pavement of the latter, with the greater part of the marble railing round the tomb have been removed by sacrilegious hands since Moor visited it. There is another Well nearer the north-western angle of the Fort very little inferior to the *Taj Bauli*. It is the work of CHAND BIBI, the wife of ALI-ADIL SHAH, and daughter of one of the NIZAM SHAHI sovereigns, who in the reign of IBRAHIM 2d. repaired to her brother's court, and defended *Ahmednagar* so gallantly against SULTAN-MURAD, and whose heroism received so just a tribute from the pen of FERISHTA. On one side of this fine Well is a neat little mosque. The *Upper Burj*, or lofty castle, beside of the Fort was built by HYDER KHAN, a noble in the court of IBRAHIM ADIL-SHAH III. There is a small but neat building called the *Kadem-i-Rasul*, but vulgarly and improperly so, as it is supposed, to have contained a few precious hairs of the prophet's beard; not an impression of his foot; MUHAMMED SHAH [illegible]

(o) The last King of the Deccan SHAH opinion of [illegible] on princes by AURENGZEB.

them from this place to a grand edifice which he erected close for the Mahom[illegible] hall in the Citadel, and communicating with it, and which he at first intended for his own Palace. By another account it appears that they were deposited by AURANGZEB in the palace of MUHAMMED, which is now called *Alam-i-Sharif*, from the holy relics it is still believed to contain. This absurd story of the *Alam-i-Sharif* is alluded to by FERISHTA, who relates that, MUHAMMED SALIH HAMADANI, a venerable *Sayid*, arriving near *Bijapur*, [illegible] and bringing with him some hairs of the prophet, the SULTAN, eager to pay his respects to such valuable relics, went out to meet him, and, having conducted him into the city, entertained him with royal magnificence for many days. He endeavoured to prevail upon him to fix his residence at his court, but the holy-man was earnest to perform the pilgrimage to *Mecca*; and at his departure the SULTAN conferred upon him many rich presents, and received from him two of the sacred hairs, which he placed with care in a golden shrine set with jewels, and constantly visited it every Friday night and upon all holy-days. None now have access to them, but those who are interested in the imposture, or who are superstitious enough to believe it a reality. The dimensions of the hall of this palace, will give some idea of the whole building. It is about 50 paces long, and 15 broad, and it's height may be 35 feet. It's front has one large arch in the centre, and a smaller one on each side. Immediately before the hall is a grand reservoir 75 yards long, 60 broad, and 6 deep, into which projects a small terrace, from the central arch, with a wooden railing round it. The greatest part of the palace is in ruins. At the end of the hall lies a large slab of yellow stone richly veined, nearly 6 feet long, 2 feet broad, and one foot thick. It is of the same kind as the

(a) [illegible] D

(1) [illegible] 2d

small variegated stones which you sometimes find inlaid in the pavement in front of *Bargahs*, is considered very valuable, and water washed on it is supposed to have some medicinal virtue; this species of stone is called *Sang-i-Sumdar*.

In a handsome street leading from the eastern gate-way of the citadel to the *Yémi Masjid*, are the remains of a grand state prison, and a mint. There is also a lofty building of three stories, with a mosque adjoining it, constructed of black stone very elegantly carved in some places. This was erected by a sweeper or scavenger, who must have been what this name literally imports, for such a work would not be discreditable to a prince. You see the ruins of many splendid houses built by *Omrahs* of the court, with adjoining mosques, courts &c. The most conspicuous amongst them is the mansion of Mirzá-i-Khán, an eminent nobleman in the reign of Ali Adil-Sháh.

The Fort is abundantly supplied with water by aqueducts from *Tirwát*, the *Begam Tálab*, and other reservoirs on the Eastern side of it, and by a number of fine Wells, the principal of which have been described. The *Begam Tálab* is now out of order, and most of the other tanks were destroyed in the last reign of this sovereign, in order to prevent an enemy from sitting long before the place.

The dimensions of the large gun, called *Malik-i-Maidán*, (r) or "the king of the field" are correctly given by Major Moor (s) it was not however, as he states, cast by Aurangzéb. This immense piece of ordnance was made by Rúmi Khán, a Turkish officer of one of the Nizám Sháhi, and fell into the hands of Sultán Muhammed of *Bijapur*, who had engraved upon it in Persian this

(r) It is of the composition called *Puchrupse* or of five metals.

(s) p. 112.

inscription. "The Prince MUHAMMED-GHAZI, in splendor like "the sun, under whose shade the world sought a shelter. By "dint of his all-destroying sabre, in half the twinkling of an eye, he took "the master-of-the-field from NAZIR SHAH." This inscription was erased by the order of AURANGZEB, who had the following one substituted for it: "SHAH ALUMGIR GHAZI, emperor of kings, who "restored justice and conquered the sovereigns of the *Dekkan*, re-"duced *Bijapur*. Fortune smiled on him, and victory attained; "he has subdued the master-of-the-field." The date of the conquest is expressed by these words [illegible] (t) "he took the master-of-the-field" and is "1096 Hijri." The date cut on the gun is 1097. (u) The neatness of the chronogram is a sufficient excuse for the mistake of one year. There is an annual resort of Hindus to this gun, and it has a few constant attendants who place flowers and perfumes in and about it. There is a very ancient but substantial *Idgah* (v) in the fort built by YUSUF ADIL SHAH.

Of the buildings in the Citadel, all are in ruins, except a beautiful little mosque built by ALI-ADIL SHAH. The inside is of finely polished black granite, very neatly carved, and on the sides of the niches are several well executed sculptures of different mosques. The most conspicuous object here is a lofty edifice called *Hezar-Kendra*, or seven-stories, in one of which is a drawing on the wall of ALI-ADIL-SHAH, and RAMBHA a dancing-girl. This was part of that Sultan's palace, and the entrance to it is through a grand court 250 yards long by 80 broad. Front of the *Dhobi-Mahl*, another

(t) [illegible] literally *King of the Field*; [illegible] appears here, and in p. 1[illegible], to be confounded with [illegible] which certainly signifies, *master, owner, proprietor*, &c. Ed.

(u) A. D. 1685.

(v) Place where the two principal Muhammedan *fêtes* or festivals are celebrated.

palace, presents to the view three [illegible]; the centre one of which is of extraordinary dimensions, [illegible] broad, and 8 deep, and the height appears about 80 feet. Next to this is the *Nand Mahl*, which has the appearance from the system [illegible] built, of having been the residence of the ladies of the *Harem*. Adjoining this is the *Adawlat-Khanah*, or court of justice, situated at the extremity of a court 150 yards long by 80 broad. Here the SULTANS were installed, in a balcony projecting from the upper story, where also justice was administered. In front of the building is a large fountain, and at the opposite end of the court is a low range of buildings with a front of 30 arches, in which the UMRAHS attended in waiting. There is a black stone a few paces before the centre of this arcade, called the *mujra gah*, from which the officers of the court used to perform their obeisances. On the right of the front of the *Adawlat Khanah* is the *Sona Mahl*, which, as its name implies, was richly gilded, but now hardly a vestige of this ornament remains. Opposite to the *Sona Mahl*, is the *Kucca Mahl*, in which was kept the privy-seal. Beyond this is the *Pani Mahl*, built on the brink of the ditch on the northern side of the Citadel. The upper room is faced with black granite, covered with sculptured inscriptions in the *Nagra*, not one of which I could decypher. From this place the SULTANS used to view combats between elephants, their menagerie and training establishments, and parties of troops in review order, on a small plain immediately beyond the ditch. After having passed the eastern gateway of the Citadel, you see on entering the Fort on the left of the road four pillars of black marble, an offering from the widow of RAMRAJ, to ALI ADIL SHAH. One of them is carved, the other plain and circular. Their diameter is one cubit, and they are said to be 15 feet high: but not more than a third of them is seen, the rest being surrounded with a support of stone and mud. On the curtain outside of this gate is a carved representation of the head of RAMRAJ, inclining downwards in comme-

moration of the wretched fate of that great potentate, who was beheaded, after having been defeated and taken prisoner in a most severe battle with the allied armies of the Mukammedan sovereigns of the *Dekkan*. ALI ÂADIL-SHÂH headed the confederacy which decided the fate of the gigantic empire of *Bijnagar*. I neither saw nor heard of the equestrian statue of RÂMRÂJ at *Bijapur*, which has been mentioned in a former work, though my guide of his own accord pointed out to me the head. Within the Citadel is a very ancient *Pagoda*, from which it would appear that there was a fortress here before the Mukammedan invasion of the *Dekkan*, which partly razed, and partly repaired, improved, and extended, may have constituted the work said to have been constructed by YU'SUF ÂADIL SHÂH. The *Pagoda* is built very much in the style of the rudest excavations at *Ellora*, and appears very ancient.

4thly. THE most conspicuous amongst the buildings outside of the Fort is the *Makbara* of SULTÂN IBRÂHÎM 2d. On the outside of the body of the mausoleum over which the dome is raised, the walls are carved into Arabic inscriptions, sculptured with great skill, and disposed in every variety of ornament. The gilding and enamel, however, is entirely defaced, excepting in a small part of one of the sides, where its remains give a faint idea of its former lustre. A person looking at the illuminated page of a beautiful oriental manuscript, magnifying this, and fancying it to be represented by sculpture, painting, and gilding, on the face of a wall of black granite, will have some conception of the labour, skill, and brilliancy of this work. The whole of the *Korân* is said to be carved on the four sides of this elegant structure, in which, the utmost art and taste of the architect and the sculptor have combined to produce the richest effect. This beautiful building with it's mosque was erected by IBRAHÎM for his deceased daughter, ZUHRAH (w) SULTÂN, and on his death,

(w) Venus.

his remains were deposited here. It has unfortunately sustained some injury from the shot of that extraordinary gun "the *Malik-maidán*", which were directed against the tents of AURANGZEB, who first encamped, a little beyond the tomb. Among the numerous edifices in the old city are a good caravansara constructed by MUSTAFA KHAN; and a still more lofty one of two stones, of which only one face remains, built by a *Sáhúkár* or Banker, both situated in *Ahmedábád*. In these times *Sáhúkárs*, living under native government, do not perpetuate their memory by public works of this kind; but live in small houses, and move about in mean equipages, and in fact do every thing to conceal the real amount of their wealth, which, if discovered, might possibly become the prey of their rapacious governors. Near these caravansaras is the *dargah* (x) of *Ziyá-u-din-raia*, situated on a rising ground, and one of the neatest places of this description I have ever seen. This man came from *Bukhára* to the court of SELIM ben MOHAMMED, and died in the reign of SECANDER in 1086 Hijri, sculptured above the door of the *dargah* shows rather a ridiculous mistake about the meaning of the word, *Khwájah*, which is applied very commonly to these holy personages, and signifies lord or master. I was very politely received here by the *Sajjádah Neshin*, or superior of the *dargah*, SAIYID-MOHAMMED HUSAINI, a lineal descendant of the KHAWJAHS, whose appearance is more worldly than devout. The striking contrast between the honors paid to the memory of these devotees, and the neglect shewn to that of kings, is observable throughout *India*. The principal edifice in *Ahmedábád*, is the handsome tomb of AFZAL-KHAN SURATI, one of the principal nobles in the court of AUL-ÂADIL SHAH, and a disciple of CHINGI SHAH's, whose *dargah* is near his pupil's tomb. CHINGI SHAH was a follower of the celebrated SHAH-MADAR, the founder of a sect of *fakirs*. All those who lead about tigers, bears, and mon-

(x) Name applied to the tombs of Saints and Religious personages.

A
B
C
D

ceptible where the stones join. Every house in the Fort and City is built of stone. The style of architecture here is much superior to any specimen, that I have seen in *India*. The domes, arches and minarets, and the ornamental work, are all executed in the best taste, and really present fine specimens of the art. The gilding and enamel is very much in the Persian style, and there are some buildings, which appear to be constructed after the Turkish fashion. It will be recollected, that the sovereigns of this court were of Turkish descent, and that the greatest part of the nobility were Turks, Persians, and Tartars. There were also many foreign artists in the service of the Court, who no doubt introduced the style of building and decoration prevalent in their own countries. FERISHTA relates, that the first SULTAN YOUSUF ADIL SHAH, invited many eminent artists "from *Persia*, *Tartary*, and *Turkey*, to his court, and made them "easy under the shade of his bounty; and that his successor ISMAEL, "was himself a complete artist in painting and varnishing." These two SULTANS, with the 3d. IBRAHIM, were buried at *Gookt*, about 6 Cos. from *Sholapur*.

I regret that I am unable to render the preceding description more interesting by designs of the principal buildings, and by copies of inscriptions, which on many accounts are valuable. The object of this imperfect account, is to attract the traveller and the artist to this noble City, before the rapid progress of dilapidation shall have left only the vestiges of it's ancient grandeur. The one will here find a wide field for observation and reflection, and the other will have full scope to the employment of his pencil; and should the public hereafter be favored with a more accurate description of *Bijapur*, and with representations of it's most elegant structures, I shall be happy in having contributed by this humble effort to rescue from oblivion, the still splendid remains of one of the most magnificent Cities of *India*.

[illegible] account of the origin and progress of the [illegible] sovereignty [illegible] might be continued with [illegible] [illegible] brings the History of the [illegible] [illegible] of [illegible] (z) by the [illegible] [illegible] a period of [illegible] years, and the [illegible] [illegible] no satisfactory account [illegible] [illegible] in [illegible] (y) [illegible] [illegible] of [illegible] [illegible] [illegible] part of it would [illegible] the cause of the [illegible] of [illegible] monarchy, which, how[illegible] preserved [illegible] splendor during the greatest part of that Prince's [illegible] you [illegible] of [illegible], [illegible] the [illegible] for his [illegible] [illegible], and [illegible] left independent [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] his [illegible] [illegible] the [illegible] and the [illegible] [illegible] [illegible] [illegible] [illegible] about the year 15[illegible] A. D. was compelled to become tributary [illegible], and at the close of his reign, the [illegible] of [illegible] was [illegible] weakened by the [illegible] [illegible] of [illegible] in the reign of his [illegible] the foundations of the monarchy were completely subverted, and [illegible] [illegible] having treacherously [illegible] [illegible] general of [illegible] [illegible], and twice defeated [illegible] troops, [illegible] the greatest part of [illegible] [illegible]. [illegible] died in 15[illegible] A. D. [illegible] to his [illegible] [illegible]; and in 1585, [illegible] [illegible]

[illegible] 1098.

[illegible]

[illegible]

[illegible] dependencies, was reduced to the imperial yoke by Aurengzeb.

The [illegible] volume of [illegible]'s History of *Dekkan*, from p. 35 to 38, and from p. 56 to 73, contains a detailed account of the reign of Sicander Adil Shah, of the operations of the Imperial troops against the kingdom of *Bijapur* before the arrival of the emperor in the *Dekkan*, and of the siege and conquest of *Bijapur* by Aurengzeb. But the date of the conquest, as represented in that account of the operations in the *Dekkan*, is incorrect; for, by the inscription on the immense gun, the "*Máliki Maidán*," the true date is ascertained to be 1097 A. H. or 1685 A. D. which is also given in the *Tawarikh*, as the year in which *Bijapur* surrendered to the Imperial army. All the Persian histories, which I have consulted on this subject, are silent, respecting the fate of Sicander: but, from the minute accounts of the best informed persons at *Bijapur*, it appears that he was put to death by Aurengzeb, a few months after he surrendered himself to that emperor. When he first waited upon him, he carried upon his head the *Ajar-i-Sharif*, but those holy relics did not save him from destruction. Aurengzeb, having discovered, or having pretended to discover, that his royal captive was engaged in a conspiracy with Seyaji, put an end to his existence by having poison administered to him in a melon, or as some say, by having him crushed to death between two boards. I heard at *Bijapur* an anecdote of a conversation which passed between Aurengzeb, and his daughter, the Begum, whose sepulchre has been described, which is perhaps worth relating. On the fall of the place, the emperor was boasting to her of the success with which Providence had crowned his arms in every quarter, and of his having by the extinction of this sovereignty accomplished every object of his ambition, and subdued and dethroned

every powerful king in *Hindostan*, and the [illegible]. The Bloom observed, "your majesty, it is true, is the [illegible] of the world; but you have departed from the [illegible] policy of your illustrious "ancestors, who, when they subdued kingdoms, made the Sultans "of Decan their subjects and tributaries, and thus Decan kings of "kings; while you are now only a simple king without any subjects to pay you homage, and to give you a claim to that envied "title." [illegible] was forcibly struck with the justice of the remark, which occasioned him so much uneasiness, that he could not refrain from expressing his displeasure at the delivery of sentiments so hurtful to his vanity. When AURUNGZEBE took *Bijapor*, he gave it the name of "*Darroo Zuffur*. (d)

The Emperor's son, MUHAMMED KAM BUKSH, was appointed to the government of *Bijapor*, 1707. In that fatal year AURUNGZEBE died, and his son contended for the throne. KAM BUKSH on his arrival at *Bijapor*, assumed the ensigns of royalty, assumed the *Khutba*, and struck coins in his own name. Fortune, however, favored the arms of SHAH ALUM, who having vanquished all the competitors for *Bijapor*, recovered it under the Imperial authority until the year 1724 A. D. the epoch of the establishment of MOHAMMED OOZ-MOOLK's independence in the Deccan. It was held by his successors till 1760, when NIZAM ALI KHAN, having been completely defeated by the PESHWA BALAJEE BAJEE RAO, purchased a peace by ceding to the MAHRATTAS the fort of *Bijapor*, with other forts and districts, yielding an annual revenue of 80,00,000 rupees. From that period, the MAHRATTAS have retained possession of this Fort and its dependencies.

(d) Abundance, the name by which Aurungzebe is generally called in India.
(e) Shah Sea.
(d) The Place of Victory.

It is difficult now to ascertain the amount of revenue produced in times [illegible] of the independent sovereigns of *Bijapur*. The gross revenue of their territories, according to the *Jemma-Bundee* (e) established by AURENGZEB, was 3,38,80,000 rupees. The military force maintained by SULTAN MUHAMMED, amounted to [illegible],80,000; decreased in the time of his successor ALI ADIL SHAH, to 80,000.

Bijapur as it was and *Bijapur* as it is, are two very great places. The City is almost of ruins, as well as the palace of the *Fort*, which itself is so injured, that in one or two places in it's eastern face, one can ascend from the ditch to the ramparts. In short, nothing now remains but the durable monuments of it's ancient grandeur. What is now called the *Soobah* of *Bijapur* is only one of it's former *districts* or districts, which produced in the time of AURENGZEB 24,00,000 rupees, derived from the *hawelee*, (f) or capital, and 29 *pergunnahs* dependent on it. But this district has been dismembered under the MAHRATTA government, and it's dependent *pergunnahs* now compose several distinct *Jagirs*. One of these is the City and its dependent villages (*hawelee*) of *Bijapur*, containing 52 villages under the City, held as *Jagir* by GOKLA, one of the principal military chieftains under the PESHWA's government. The *hawelee* with it's dependencies, produced, in the time of AURENGZEB, upwards of 5,00,000 rupees; and under the MAHRATTAS, about [illegible] years ago, one lac. It's present revenue, I understand, is between 30 and 40,000 rupees, about a fourth of which is *sher* (g), and the rest *mal*, or territorial produce; and this diminution in the revenue is the consequence of a bad administration of the country, the greater part of which is now desolate.

(e) Rental.
(f) City and its dependent Villages.
(g) Imposts.

The fort has now only 50 *Sibundies* (*h*) for its garrison; the *Amil* maintains a hundred. About 9,500 rupees are distributed from the revenues of the district, among the *Mahammadan* attendants, at the different tombs and mosques, which have been described, and will be considered rather a liberal allowance from a *Hindoo* government, for the maintenance of a religious class of people of a different persuasion.

Bijapur is situated in N. lat. 17° 9′. and E. long. 75° 48′. The country is open in its immediate neighbourhood, and the climate is said to be salubrious.

(*h*) Irregular matchlock men.
(*i*) Collector.

XIV.

Essay on the Binomial Theorem; as known to the Arabs.

By J. TYTLER, Esq.

Communicated by R. TYTLER, M. D.

FOR a long time it was imagined that the discovery of the law which determines the coefficients of the terms of the powers of a Binomial Root, commonly called the Binomial Theorem, was entirely owing to SIR ISAAC NEWTON. My present distance from books and other sources of information compels me, in proof of this, to refer to so common a work, as JOHN WARD's Popular Introduction to Mathematics. He explains the Theorem, in part II. chap. 2, § 5, and concludes with these words: "Now from these considerations it was, that I proposed this method of raising powers in my Compendium of Algebra, page 51, as wholly new (viz. so much of it as was there useful), having then (I profess) neither seen the way of doing it, nor so much as heard of its being done. But, since the writing of that tract, I find in Dr. WALLIS

History of Algebra, page 419 and 420, that the learned Sir Isaac Newton had discovered it long before, which the doctor [illegible] in this manner:

"Let n be the exponent of the power;

Then $1 \times \frac{n-1}{1} \times \frac{n-2}{2} \times \frac{n-3}{3} \times \frac{n-4}{4} \times \frac{n-5}{5}$ &c.

will be the series of the Dignior required; but he doth not tell us how they first came to be found out, nor have I met with the least hint of it in any author."

THOMAS SIMSON, also, in the 5th section of his Algebra, attributes it without any hesitation to SIR ISAAC NEWTON. At last, the late Dr. HUTTON, in the 77th page of the introduction to his excellent Mathematical Tables, edition IVth, showed that this Theorem, as far as relates to integers, was known before the time of SIR ISAAC, and that his merit consisted in the extension of it to fractions. The passage is not very long, and will save the trouble of a reference, and bring the whole subject at once before the reader; I shall therefore transcribe it.

"Now assigning the coefficients of the terms in the multiple expressions, our author (BARROW) here delivers the construction of figurate or polygonal numbers, inserts a large table of them, and teaches their several rules: one of which is, that every other number, taken in the diagonal lines, forms the coefficients of the terms of the general equation by which the sides and chords of multiple arcs are expressed, which he simply delivers, and says, that the same diagonal numbers continue to the

coefficients of the terms of any power of a Binomial; which property was also mentioned by Vieta in his Angulares Sectiones. This was, indeed, before him, pretty fully treated of by Stifelius, in his Arithmetica Integra, fol. 41 and seq.; where he inserts and makes use of such a table of figurate numbers, in extracting the roots of all powers whatever. But it was perhaps known much earlier, as appears by the treatise on figurate numbers by Nicomachus (see Malcolm's History, p. XVIII.) Though indeed, Cardan seems to ascribe this discovery to Stifelius. See his Opus Novum de Proportionibus Numerorum, where he quotes it, and extracts the table and its use from Stifelius's book. Cardan, in p. 135. &c. of the same work, makes use of a like table to find the number of variations or conjugations, as he calls them. Stevinus, too, makes use of the same coefficient and method of roots as Stifelius. (See his Arith. p. 25.) And even Lucas de Burgo extracts the cube root by the same coefficients, about the year 1470. But he does not go to any higher roots. And this is the first mention I have seen of this law of the coefficients of the powers of a Binomial, commonly called Sir J. Newton's Binomial Theorem; although it is very evident that Sir Isaac was not the first inventor of it. The part of it properly belonging to him, seems to be, only the extending it to fractional indices, which was indeed an immediate effect of the general method of deducing all roots like powers with fractional exponents, the Theorem being [illegible]. However, it appears, that our author Bhaskara was the first who taught the rule for generating the coefficients of the terms successively one from another, of any power of a Binomial, from those of any other power. For having [illegible]

Abacus Pythagoricus (which he so calls on account of its frequent and extensive use, and of which a small specimen is here annexed,) that the numbers in the diagonal directions, ascending from right to left.

Abacus Pythagoricus.							
H −(8)	G −(7)	F +(6)	E +(5)	D −(4)	C −(3)	B +(2)	A (1)
9	8	7	6	5	4	3	2
		28	21	15	10	6	3
		84	56	35	20	10	4
			126	70	35	15	5
				126	56	21	6
					84	28	7
						36	8
							9

are the coefficients of the powers of Binomials, the indices being the figures in the first perpendicular column A, which are also the coefficients of the 2d terms of each power, (those of the first terms being 1, are here omitted); and that any one of these diagonal numbers is in proportion to the next higher in the diagonal, as the vertical of the former is to the marginal of the latter; that is, as the uppermost number in the column of the former is to the first or right hand number in the line of the latter. Having shewn these things, I say, he thereby teaches the generation of the coefficients of any power, independently of all other powers, by the very same law or rule which we now use in the Binomial Theorem. Thus, for the 9th power; 9 being the coefficient of the 2d term, and 1 always that of the 1st, to find the 3d coefficient, we have 2 . 8 :: 9 : 36; for the 4th term, 3 : 7 :: 36 : 84; for the 5th term, 4 : 6 :: 84 : 126; and so on for the rest. That is to say, the coefficients in the terms in any power are, inversely as the vertical numbers or first line 1, 2,

3, 4, ... &c, and directly as the ascending numbers [illegible] 1, in the first column A; and the consequently those co-efficients are found by the continual multiplication of the fractions $\frac{m}{1}, \frac{m-1}{2}, \frac{m-2}{3}, \frac{m-3}{4} \ldots \frac{m}{n}$, which is the very Theorem as it stands at this day, and as applied by NEWTON to roots or fractional exponents, as it had before been used for integral powers. This Theorem then being thus plainly taught by BRIGGS about the year 1600, it is surprising how a man of such general reading as Dr. WALLIS was, could possibly be ignorant of it, as he plainly appears to be by the 85th chapter of his Algebra, where he fully ascribes the invention to NEWTON, and adds, that he himself had formerly sought for such a rule but without success; or how Mr. JOHN BERNOUILLI, not half a century since, could himself first dispute the invention with NEWTON, and then give the discovery of it to M. PASCAL, who was not born till long after it had been taught by BRIGGS. See BERNOUILLI's *works, vol. 4. pa.* 178. But I do not wonder that BRIGGS's remark was unknown to NEWTON, who owed almost every thing to genius and deep meditation, but very little to reading; and I have no doubt that he made the discovery himself, without any light from BRIGGS, and that he thought it was new for all powers in generals, as it was indeed for roots and quantities with fractional and irrational exponents."

THUS far Dr. HUTTON. Mr. REUBEN BURROWS in the 3d volume of the Asiatic Researches, Appendix No. V. suspects that this rule was known to the *Hindus*. I am now about to show, that it was also [illegible] the *Arabians*. It is to be found in two of their Arithmetical books

[illegible]

In the *Miftah-ul-Hisab*, [illegible] composed by [illegible] in Muscovy in the reign of [illegible] grandson of Timur, and in the *Ayyan-ul-Hisab*, or rules of [illegible] composed by Muhammad Baqir in the reign of Shah Abbas I, about the year [illegible]. Neither of these works is very [illegible] to be met with, at least in that part of India where I am [illegible], and I have not as yet been able to procure more than an extract of each. The author of the *Miftah-ul-Hisab* declares (I am told) that his rule is not invented by himself, but taken from authors more ancient still. His rule is much more complicated than that in the *Ayyan-ul-Hisab*, and presupposes an acquaintance with former parts of the work, which are not in my possession. I do not therefore transcribe that, but proceed to give the rule as it stands in the *Ayyan-ul-Hisab*, premising that the coefficients of the powers are called [illegible] of the power, which I have translated Radices Locorum; and the first power of a number, that is, the number itself considered as a root, is called the [illegible] or [illegible] which I have, in like manner, translated Latus or Latus Primum.

[illegible] ان اصول [illegible] كل مصلح هي [illegible] بازاء المصلح الاول والمضاعفات [illegible]
[illegible] ان تكتب اسامي المصلح والمضاعفات [illegible] على المصلح [illegible] مرتبا في سطر
طولي [illegible] ذلك المصلح وتضعه بازاء [illegible] ثم تنقص منه واحدا وتضرب [illegible]
[illegible] المصلح او بالعكس وتضع الحاصل بازاء [illegible] ثم تنقص منه اثنين [illegible]
[illegible] بازاء [illegible] او بالعكس وتضع الحاصل بازاء [illegible] ثم تنقص [illegible]
[illegible] الباقي فيما [illegible] بازاء [illegible] او بالعكس وتضع الحاصل بازاء [illegible]
[illegible] ان ينتهي [illegible] بازاء كل [illegible] من [illegible] الوسطى [illegible]
[illegible] بازاء [illegible]

[illegible] ان يتم [illegible] نستخرج اصول منازل [illegible]
مال كعب كعب الكعب [illegible] مرتبة المضلع بازاء الضلع والاخير [illegible]
منه واحد اوضم بناء في نصف ١٢ ورسمنا [illegible] الحاصل بازاء المال وبازاء قبل الاخير [illegible]
[illegible] وضربنا العشرة الدائرة في ثلاثة [illegible] بازاء المال ورسمنا الحاصل وهو ٢٢٠ بازاء
الكعب والنظيرة ثم نقصنا منه ثلثه وضربنا التسعة الباقية في رابع ما بازاء الكعب ورسمنا
الحاصل وهو ٤٩٥ بازاء مال المال والنظيرة ثم نقصنا منه اربعة وضربنا الثمانية الباقية في
[illegible] بازاء مال مال ورسمنا الحاصل وهو ٧١٢ بازاء مال الكعب والنظيرة ثم نقصنا
منه خمسة وضربنا السبعة الباقية في سدس ما بازاء مال الكعب ورسمنا الحاصل وهو ١٢٣
بازاء كعب الكعب [illegible] الاعداد المرسومة اصول منازل كعب كعب الكعب وهذه صورته

آحاد مضلع ومضلعات سابقة مضلع مطلوب	اعداد اصول منازل
ضلع	١٢
مال	٦٦
كعب	٢٢٠
مال مال	٤٩٥
مال كعب	٧١٢
كعب كعب	٩٢٣
مال مال كعب	٧١٢
مال كعب كعب	٤٩٥
كعب كعب كعب	٢٢٠
مال مال كعب كعب	٦٦
مال كعب كعب كعب	١٢

44. BINOMIAL THEOREM.

[illegible]

Observe that the Radices Laterum of each power are numbers which are placed opposite the Latus Primum, and the preceding powers (viz. those powers whose Indices are less than that of the power whose Radices Laterum or coefficients are required), and the method of discovering them is as follows:—Let the names of the Latus, and of the powers preceding or lower than the given one, be written in a row of very [illegible] (viz. in a line from the top to the bottom of the page), and take the number of the index of the given power, and place it opposite the name of the Latus, then subtract from it, and multiply $\frac{1}{2}$ of the remainder into the number which is placed opposite the Latus, or the contrary, (i.e. or multiply the remainder into half of that which is placed opposite the Latus), and place the product opposite the name of the square, then subtract 2 from it (viz. from the index of the given power), and multiply $\frac{1}{3}$ of the remainder into that which is placed opposite the square or the contrary, and place the product opposite the cube, then subtract 3 from it, and multiply $\frac{1}{4}$ of the remainder into that which is placed opposite the cube or the contrary, and place the product opposite the biquadrate, and so on to the end, and

then by a [illegible] consequence the same number will be found in every place, which is equally distant from the middle of the two middle ones; therefore, if you chuse to write the first found figure and in the last place, (as in the present instance) that which is written opposite the Latus and square may be written opposite the biquadrate and cube, and so on till it be completed. For example, let it be required to find the radicem cocum of the cubris cubi cubi cubi. Let us write from the Latus to the quadratic cubi cubi cubi as was directed, and let us write 12 which is the index of the given power opposite the Latus and the last place, and subtract 1 from it, and let us multiply it into the $\frac{1}{2}$ of 10, and write 63 the product opposite the square and the penultimate place, then subtract 2 from it, and multiply 10 which is the remainder, into $\frac{1}{3}$ of what we wrote opposite the square, and write the product, which is 220, opposite the cube and that place which agrees with it (i. e. which is equally distant from the middle on the other side), then subtract 3 from it, and multiply 9 the remainder into $\frac{1}{4}$ of that which is opposite the cube, and write the product, which is 495, opposite the biquadrate and that which agrees with it, then subtract 4 from it, and multiply 8, the remainder, into $\frac{1}{5}$ of that which is opposite the biquadrate, and write the product, which is 792, opposite the quadratic cubi and that which agrees with it, then subtract 5 from it, and multiply 7 the remainder into 16th of that which is opposite the quadratic cubi, and write the product, which is 924, opposite the cubris cubi, and then these num-

[illegible] Ratione, the [illegible] Radices [illegible] of the [illegible] cubi cubi, [illegible] of which this is the table.

[illegible] Powers preceding the given Power	Numbers of Radices [illegible]
Latus	[illegible]
Quadratum	66
Cubus	220
Biquadratum	495
Quadratus cubi	792
Cubus cubi	924
Quadratus quadrati cubi	792
Quadratus cubi cubi	495
Cubus cubi cubi	220
Quadratus quadrati cubi cubi	66
Quadratus cubi cubi cubi	12

Hence then this power of every number is equal to the sum of the powers of its two parts, and 12 times each of these two parts multiplied into the quadratus cubi cubi cubi of the other; and 66 times the quadratum of each of them into the quadratus quadrati cubi cubi of the other, and 220 times the cubi of each of them into the cubus cubi cubi of the other; and 495 times the biquadratum of each of them into the quadratus cubi cubi of the other; and 792 times the quadratus cubi of each of them into the quadratus quadrati cubi of the other, and 924 times the cubus cubi of one of them into the cubus cubi of the other, and so of other cases."

FROM this very clear rule it plainly appears, that whatever may have been the case in *Europe*, yet long before the time of BRIGGS the *Arabians* were acquainted with the rule for generating the coefficients of the terms successively one from another, of any power of a Binomial, independently of those of any other power; and thus proof is added to the many others, that *Musulmans*, before the stimulus of *Muhammed's* newly imbibed doctrines had ceased and their narcotic effects began to appear, were much superior in science to contemporary Christians.

IT is but justice that I should add, that my first knowledge of this rule was obtained from the *Khazanut-ul Ilm*, which is a complete system of Arithmetic, Algebra, and Geometry, as far as known to the *Arabians* and *Hindus*, composed in the present day by KHAN JEE, a most intelligent inhabitant of *Patna*. On my requesting to know from what original authors the rule was taken, this gentleman was kind enough to favour me with the above extract. No more I think is required to demonstrate, that his own work highly deserves translation and publication.

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